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ESTABLISHED 1903

THE AUTOMOBILE TRADE DIRECTORY

PUBLISHED QUARTERLY

APRIL, 1911

243-249 W. 39TH ST.
NEW YORK

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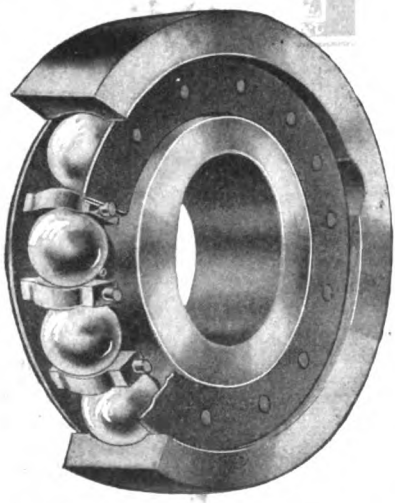
(MADE IN GERMANY)



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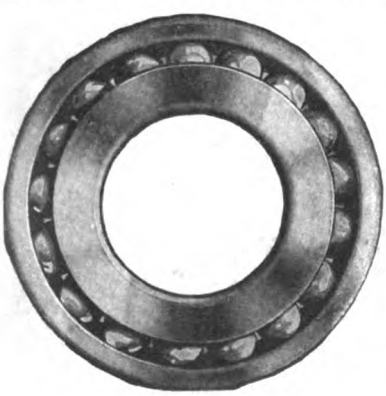

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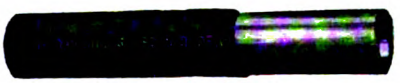

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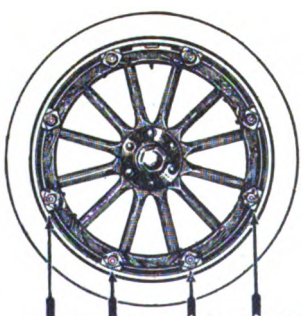

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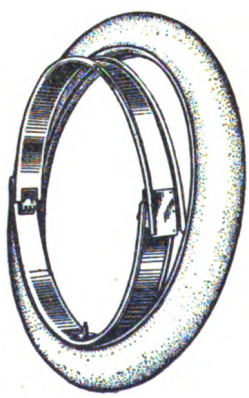

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A Classified List, issued quarterly, containing the Names and Addresses of American Manufacturers of Automobiles, Commercial Vehicles, Motor Boats, Motor Cycles, Aeroplanes and of all manufacturers of Materials, Component Parts, Accessories, Machinery, Tools, Shop Equipment and Supplies. Contains also "Tables and Data for Engineers" and other pertinent information.

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Classified Trade Directory

— OF —

The Motor Industries, Including Manufacturers of Automobiles, Commercial Vehicles, Motor Boats, Motorcycles, Aeroplanes and Makers of Component Parts, Accessories, Machinery, Tools, Shop Equipment and Supplies.

COMPLETE VEHICLES

(The following is a list of the principal manufacturers of complete vehicles, together with brief specifications and prices of their various models.)

PLEASURE VEHICLES

GASOLINE VEHICLES

(Unless otherwise mentioned all cars are equipped with 4-cycle water-cooled motors.)

ABBOTT-DETROIT—See Abbott Motor Car Co.

ABBOTT Motor Co., Detroit, Mich. "Abbott-Detroit."
(See page 57.)
Touring Car and Roadster, 4 cyl., 25.6 H. P. $1,500
Demi Tonneau, 4 cyl., 25.6 H. P. 1,650
Coupe, 4 cyl., 25.6 H. P. 2,250

ABENDROTH & Root Mfg. Co., Newburgh, N. Y. "Frontenac."
Touring Car and Roadster, 4 cyl., 40-45 H. P. $3,500
Limousine, 4 cyl., 40-45 H. P. 4,500

ACME Motor Car Co., Reading, Pa. "S. G. V."
Touring Car and Runabout, 4 cyl., 22.5 H. P. $2,500

ALCO—See American Locomotive Co.

ALLEN-KINGSTON Motor Car Co., New York, N. Y.
Roadster, 4 cyl., 48 H. P. $4,250
Baby Tonneau, 4 cyl., 48 H. P. 4,300
Touring Car, 4 cyl., 48 H. P. 4,400

AMERICAN Locomotive Co., Providence, R. I. "Alco."
Touring Car, Toy Tonneau and Runabout, 4 cyl., 40 H. P. $4,500
Limousine and Landaulet, 4 cyl., 40 H. P. $5,500
Town Car, 4 cyl., 22 H. P. 4,350
Touring Car, Runabout and Toy Tonneau, 6 cyl., 60 H. P. 6,000
Limousine and Landaulet, 6 cyl., 60 H. P. 6,750

AMERICAN Motors Co., Indianapolis, Ind.
(See page 765.)
Touring Car, 4 cyl., 30 H. P. $2,250
Roadster, Toy Tonneau and Touring Car, 4 cyl., 50 H. P. $4,250
Limousine and Coupe, 4 cyl., 50 H. P. 5,250

AMPLEX—See Simplex Motor Car Co.

APPERSON Bros. Automobile Co., Kokomo, Ind. "Jack Rabbit."
Touring Car, 4 cyl., 50 H. P. $4,200
Touring Car, 4 cyl., 40 H. P. 3,000
Fore Door Touring Car, 4 cyl., 30 H. P. 2,250
Touring Car, 4 cyl., 30 H. P. 2,000

APPERSON-LEE Motor Co., 612 Maine St., Lynchburg, Va. (Dealers.)
(See page 761.)

ATLANTA Motor Car Co., Atlanta, Ga. "White Star."
(See page 39.)
Touring Car, 4 cyl., 35 H. P. $1,750
Roadster, 4 cyl., 35 H. P. 1,600

ATLAS Motor Car Co., Springfield, Mass.
Touring Car, 4 cyl., 40 H. P. (2 cycle) . $2,400
Toy Tonneau, 4 cyl., 40 H. P. (2 cycle) 2,250
Runabout, 4 cyl., 40 H. P. (2 cycle) .. 1,250

AUBURN Automobile Co., Auburn, Ind.
Touring Car, 2 cyl., 24 H. P. $1,000
Touring Car and Close Coupled, 4 cyl. 30 H. P. 1,400
Touring Car, Baby Tonneau and Close Coupled, 4 cyl., 35-40 H. P. 1,700

AUSTIN Automobile Co., Grand Rapids, Mich.
5-Passenger Touring Car, 6 cyl., 45-60 H. P. $3,000
7-Passenger Touring Car, 6 cyl., 45-60 H. P. 3,250
5-Passenger Touring Car, 6 cyl., 50-75 H. P. 3,750
7-Passenger Touring Car, 6 cyl., 50-70 H. P. 4,500

Complete Index to Classification appears on Pages 8 to 22.

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Studebaker

A Complete Automobile Line

The Studebaker "40"
The E-M-F "30"
The Flanders "20"
Electric Pleasure Vehicles
Electric Commercial Vehicles

Latest approved designs. All styles of bodies.

Quality—Service—Beauty—unquestioned.

Thousands of satisfied owners, and all helping sell more of our products.

It's the Line for You

Get prices, terms and territory now.

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Automobile Division
E-M-F Factories
DETROIT, MICHIGAN

General Offices
SOUTH BEND
INDIANA

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PLEASURE VEHICLES
(Continued)

GASOLINE VEHICLES (Continued)

5-Passenger Touring Car, 6 cyl., 60-90 H. P. $5,750
7-Passenger Touring Car, 6 cyl., 60-90 H. P. 6,000

AUTOCAR Co., Ardmore, Pa.
Touring Car, 4 cyl., 30.6 H. P. $2,250

B. C. K. Motor Car Co., York, Pa. "Kline Kar."
(See page 55.)
Runabout, 4 cyl., 24 H. P. $1,500
Runabout, 4 cyl., 30 H. P. 1,625
Touring Car and Toy Tonneau, 4 cyl., 30 H. P. 1,675
Runabout, 4 cyl., 40 H. P. 2,225
Touring Car and Toy Tonneau, 4 cyl., 40 H. P. 2,250
Runabout, 6 cyl., 50 H. P. 2,650
Touring Car and Toy Tonneau, 6 cyl., 50 H. P. 2,700
Runabout, 6 cyl., 60 H. P. 2,950
Seven Passenger Touring Car, 6 cyl., 60 H. P. 3,250

BADGER Motor Car Co., Columbus, Wis.
Roadster and Touring Car, 4 cyl., 30 H. P. $1,250

BARTHOLOMEW Co., Peoria, Ill. "Glide."
Touring Car and Roadster, 4 cyl., 45 H. P. $2,000

BLACK CROW—See Black Mfg. Co.

BRUSH Runabout Co., Detroit, Mich.
Runabout 1 cyl., 10 H. P. $485
Runabout, 1 cyl., 10 H. P. 505
Runabout, 1 cyl., 10 H. P. 510
Roadster, 1 cyl., 10 H. P. 600
Coupe, 1 cyl., 10 H. P. 850

BUCKEYE Mfg. Co., Anderson, Ind. "Lambert."
Roadster, 4 cyl., 35 H. P. $1,000
Touring Car, 4 cyl., 35 H. P. 1,350
Fore Door Touring Car, 4 cyl., 35 H. P. 1,400
Torpedo, 4 cyl., 35 H. P. 1,600
Touring Car, 4 cyl., 40 H. P. 1,700

BUICK Motor Co., Flint, Mich.
Touring Car, 4 cyl., 25.6 H. P. $1,150
Roadster and Touring Car, 4 cyl., 32.4 H. P. 1,850
Touring Car, 4 cyl., 28.8 H. P. 1,500
Touring Car, 4 cyl., 22.8 H. P. 950
Roadster, 4 cyl., 25.6 H. P. 1,050
Roadster, 4 cyl., 22.8 H. P. 800

CADILLAC Motor Car Co., Detroit, Mich.
Touring Car, Demi-Tonneau and Roadster, 4 cyl., 32.4 H. P. $1,700
Limousine, 4 cyl., 32.4 H. P. 3,000
Coupe, 4 cyl., 32.4 H. P. 2,250
Fore Door Touring Car, 4 cyl., 32.4 H. P. 1,800
Torpedo, 4 cyl., 32.4 H. P. 1,850

CAMERON Car Co., Beverly, Mass.
Surrey, 4 cyl., 24 H. P. (Air Cooled) .. $875
Touring Car, 4 cyl., 24 H. P. (Air Cooled) 1,050
Runabout, 4 cyl., 24 H. P. (Air Cooled) 800
Roadster, 4 cyl., 24 H. P. (Air Cooled) 850
Fore Door Runabout, 4 cyl., 24 H. P. (Air Cooled) 1,000
Fore Door Touring Car, 4 cyl., 24 H. P. (Air Cooled) 1,250
Touring Car, 6 cyl., 36 H. P. (Air Cooled) 1,500
Fore Door Runabout, 6 cyl., 36 H. P., (Air Cooled) 1,250
Fore Door Touring Car, 6 cyl., 36 H. P. (Air Cooled) 1,550

CARHARTT Automobile Corp., Detroit, Mich.
Fore Door Touring Car, Demi Tonneau and Roadster, 4 cyl., 50 H. P. $2,500
Runabout and Touring Car, 4 cyl., 30 H. P. 1,100

CARTER Motor Car Corp., Washington, D. C. "Washington."
Touring Car, Roadster and Toy Tonneau, 4 cyl., 40 H. P. $2,250

CARTERCAR Co., Pontiac, Mich.
Roadster, 4 cyl., 30 H. P. $1,150
Touring Car, 4 cyl., 35 H. P. 1,600
Touring Car, 4 cyl., 40 H. P. 1,875

CASE Threshing Machine Co., J. I., Racine, Wis.
Fore Door Touring Car, Touring Car and Roadster, 4 cyl., 30 H. P. $1,750
Torpedo, 4 cyl., 30 H. P. 1,850
Limousine, 4 cyl., 30 H. P. 2,850

CHADWICK Engineering Works, Pottstown, Pa.
Touring Car, Runabout, Miniature Tonneau and Standard Tourabout, 6 cyl., 60 H. P. $5,500
Limousine and Landaulet, 6 cyl., 60 H. P. 6,500
Victoria, 6 cyl., 60 H. P. 5,750

CHALMERS Motor Co., Detroit, Mich.
Limousine, 4 cyl., 30 H. P. $3,000
Pony Tonneau, 4 cyl., 30 H. P. 1,600
Coupe, 4 cyl., 30 H. P. 2,400
Touring Car and Roadster, 4 cyl., 30 H. P. 1,500
Touring Car and Roadster, 4 cyl., 40 H. P. 2,800
Torpedo, 4 cyl., 40 H. P. 3,000

CINO—See Haberer & Co.

CLARK Motor Car Co., Shelbyville, Ind.
Surrey, 4 cyl., 30 H. P. $1,050
Touring Car and Roadster, 4 cyl., 30 H. P. 1,250
Touring Car, 4 cyl., 40 H. P. 1,600

CLARKE-CARTER Automobile Co., Jackson, Mich. "Cutting."
(See page 56.)
Roadster, 4 cyl., 30 H. P. $1,100
Touring Car, 4 cyl., 35 H. P. 1,350
Touring Car, 4 cyl., 40 H. P. 1,650
Fore Door Touring Car, 4 cyl., 35 H. P. 1,700
Torpedo, 4 cyl., 40 H. P. 1,750
Fore Door Touring Car, 4 cyl., 60 H. P. 2,250
Torpedo, 4 cyl., 60 H. P. 2,350

COATES-GOSHEN Mfg. Co., Goshen, N. Y.
Baby Tonneau and Touring Car, 4 cyl., 45 H. P. $3,500
Baby Tonneau and Touring Car, 4 cyl., 32 H. P. 3,000

COLBURN Automobile Co., Denver, Colo.
Touring Car and Runabout, 4 cyl., 40 H. P. $3,500

COLE Motor Car Co., Indianapolis, Ind.
(See page 53.)
Fore Door Touring Car, Roadster and Toy Tonneau, 4 cyl., 30-36 H. P. $1,650

COLUMBIA Motor Car Co., Hartford, Conn.
Touring Car and Close Coupled, 4 cyl., 32 H. P. $2,750
Seven Passenger Touring Car, 4 cyl., 32 H. P. 3,000
Limousine, 4 cyl., 32 H. P. 3,850
Close Coupled and Roadster, 4 cyl., 45 H. P. 3,300
7 Passenger Touring Car, 4 cyl., 45 H. P. 3,500
Limousine, 4 cyl., 45 H. P. 4,800
Landaulet, 4 cyl., 45 H. P. 4,900

COLUMBUS Buggy Co., Columbus, O. "Firestone-Columbus."
Touring Car, 4 cyl., 42 H. P. ..... $ ——
Roadster, 4 cyl., 24-26 H. P. ..... ——

CONTINENTAL—See Indiana Motor & Mfg. Co.

Complete Index to Classification appears on Pages 8 to 22.

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Marathon

MARATHON Models include Torpedo Touring Car, Fore-Door Touring Car, Standard Touring Car, Standard Roadster and Torpedo Roadster. Prices from $1500 to $1700.

We have a catalogue which describes in detail the wealth of mechanical excellence, finish and dependable utility that characterizes the MARATHON. And it's yours for the asking. Won't you ask for it?

Not Simply a Car—But Car Service

Now is the time of year when you are beginning to think of the car you will buy in the spring. You will give the matter careful consideration, and you should not be influenced by the misleading claims of some manufacturers. If your judgment is sound you will make a profitable investment.

There are several cars made, selling from $1,500 to $2,000, that would prove a good investment. And among these few cars some would give you even more value for your money.

Remember, when you buy, that the absolute limit of dollar-for-dollar return is reached in cars selling under $2,000. When you pay more your returns are not in proportion to your investment. You are paying for something you are not getting.

Buying an automobile is like buying any reliable stock. There should be steady dividends.

Dividends in the health of out-of-doors that a good car brings. Dividends in the time saved by the quick response of a willing servant. Dividends in consistent car service and the lasting satisfaction of a good car, free from mechanical defects and poor workmanship.

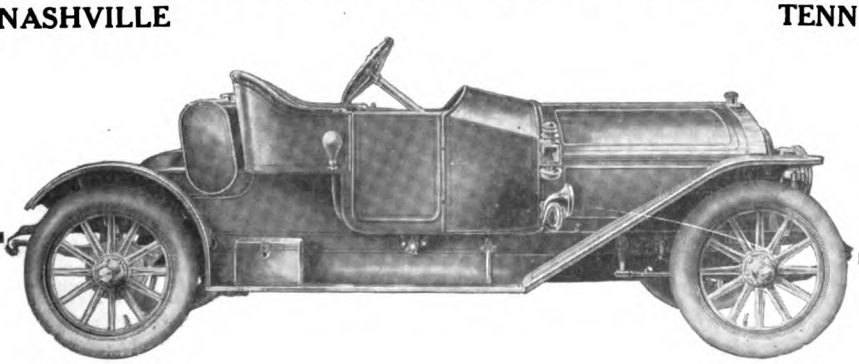
To get all this you must buy, not simply a car, but car service. You must buy correct design, accurate construction and good materials. You must buy sound motor car value.

In the MARATHON you get all this.

But don't accept our mere statement, for we can convince you of its truth. The burden of the proof is with us. With you lies the judgment.

SOUTHERN MOTOR WORKS

NASHVILLE **TENN.**



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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

CORBIN Motor Vehicle Corp., New Britain, Conn.
Touring Car and Roadster, 4 cyl. 30 H. P. $2,000
Touring Car and Toy Tonneau, 4 cyl., 30 H. P. 2,750
Touring Car and Toy Tonneau, 4 cyl., 40 H. P. 3,000
Limousine, 4 cyl., 40 H. P. 4,000
Torpedo, 4 cyl., 40 H. P. 3,100

CORREJA—See Vandewater & Co.

CRAWFORD Automobile Co., Hagerstown, Md.
Roadster, 4 cyl., 30 H. P. $1,325
Touring Car, 4 cyl., 30 H. P. 1,375
Touring Car, 4 cyl., 35 H. P. 1,650

CROW Motor Car Co., Chicago, Ill.
Roadster, 4 cyl., 30 H. P. $1,000
Surrey, 4 cyl., 30 H. P. 1,100
Pony Tonneau and Torpedo Roadster, 4 cyl., 30 H. P. 1,150
Touring Car, 4 cyl., 30 H. P. 1,300
Fore Door Touring Car, 4 cyl, 35 H. P. 1,500
Roadster, 4 cyl., 40 H. P. 1,650
Fore Door Touring Car, 4 cyl., 40-45 H. P. 1,750

CROXTON Motor Co., Cleveland, O.
(See page 41.)
7-Passenger Touring Car, Close Coupled and Roadster, 4 cyl., 45 H. P. $3,500
Limousine, 4 cyl., 45 H. P. 4,500
Roadster, 4 cyl., 30 H. P. 2,250
Suburban, 4 cyl., 30 H. P. 2,350
Landaulet, 4 cyl., 30 H. P. 3,500
Brougham, 4 cyl., 30 H. P. 3,500

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.
(See page 765.)
Touring Car and Torpedo, 4 cyl., 40 H. P. $3,500
Runabout, 4 cyl., 40 H. P. 3,250
Limousine, 4 cyl., 40 H. P. 4,500

CUTTING—See Clarke-Carter Automobile Co.

DAYTON Motor Car Co., Dayton, O. "Stoddard-Dayton."
Roadster, 4 cyl., 50 H. P. $2,850
Fore Door Touring Car and Torpedo, 4 cyl., 50 H. P. 3,000
Limousine, 4 cyl., 50 H. P. 4,200
Roadster, 4 cyl., 40 H. P. 2,200
Touring Car, 4 cyl., 40 H. P. 2,300
Torpedo, 4 cyl., 40 H. P. 2,350
Fore Door Touring Car, 4 cyl., 40 H. P. 2,400
Roadster, 4 cyl., 30 H. P. 1,550
Touring Car, 4 cyl., 30 H. P. 1,700
Fore Door Touring Car, 4 cyl., 30 H. P. 1,750
Coupe, 4 cyl., 30 H. P. 2,350
Limousine and Landaulet, 4 cyl., 30 H. P. 2,700
Roadster, 4 cyl., 20 H. P. 1,175
Touring Car, 4 cyl., 20 H. P. 1,275
Fore Door Touring Car, 4 cyl., 20 H. P. 1,325

DE TAMBLE Motors Co., Anderson, Ind.
(See page 37.)
Runabout, 2 cyl., 16 H. P. $650
Roadster, 4 cyl., 36 H. P. 1,000
Touring Car, 4 cyl., 36 H. 1,150
Fore Door Touring Car, 4 cyl., 36 H. P. 1,200

DEAL Motor Vehicle Co., Jonesville, Mich.
Touring Car, 4 cyl., 30 H. P. $1,250
Surrey, 4 cyl., 30 H. P. 1,000

DORRIS MOTOR CAR CO., St. Louis, Mo.
(See page 43.)
Touring Car and Roadster, 4 cyl., 30 H. P. $2,500
Coupe, 4 cyl., 30 H. P. 2,650
Limousine, 4 cyl., 30 H. P. 3,600

ELKHART Motor Car Co., Elkhart, Ind. "Sterling."
Touring Car and Runabout, 4 cyl., 40 H. P. $1,750

E-M-F Co., Detroit, Mich.
(See page 599.)
Touring Car, 4 cyl., 30 H. P. $1,000
Runabout, 4 cyl., 20 H. P. 700
Roadster and Suburban, 4 cyl., 20 H. P. 725

ELKHART Carriage & Harness Mfg. Co., Elkhart, Ind. "Pratt-Elkhart."
Roadster and Touring Car, 4 cyl., 40 H. P. $1,750
Fore Door Touring Car, 4 cyl., 40 H. P. 1,800
Limousine, 4 cyl., 40 H. P. 3,000

ELMORE Mfg. Co., Clyde, O.
Roadster, 4 cyl., 30 H. P. (2 cycle) .. $1,200
Touring Car, 4 cyl., 30 H. P. (2 cycle) 1,250
Touring Car, 4 cyl., 50 H. P. (2 cycle) 1,750
Touring Car, 4 cyl., 70 H. P. (2 cycle) 2,500

EMPIRE Motor Car Co., Indianapolis, Ind.
Speedster, 4 cyl., 20 H. P. $950

ENGER Motor Car Co., Cincinnati, Ohio.
Touring Car, 4 cyl., 40 H. P. $2,000
Fore Door Touring Car, 4 cyl., 40 H. P. 2,150
Torpedo, 4 cyl., 40 H. P. 1,875
Torpedo Runabout, 4 cyl., 40 H. P. 1,775

EVERITT 30—See Metzger Motor Car Co.

F-A-L Motor Co., Chicago, Ill.
Fore Door Touring Car and Roadster, 4 cyl., 35-40 H. P. $1,850

FIRESTONE-COLUMBUS — See Columbus Buggy Co.

FORD Motor Co., Detroit, Mich.
Touring Car, 4 cyl., 20 H. P. $780
Torpedo Runabout, 4 cyl., 20 H. P. .. 725
Roadster and Runabout, 4 cyl., 20 H. P. 680
Coupe, 4 cyl., 20 H. P. 1,050
Town Car, 4 cyl., 20 H. P. 1,200

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.
Touring Car, Runabout and Torpedo, 4 cyl., 90 H. P. (2 cycle) $4,500
Touring Car, Runabout and Torpedo, 4 cyl., 50 H. P. (2 cycle) 3,750
Touring Car and Runabout, 4 cyl., 30 H. P. (2 cycle) 2,500

FRANKLIN Mfg. Co., H. H., Syracuse, N. Y.
Touring Car and Torpedo, 6 cyl., 48 H. P. (Air Cooled) $4,500
Touring Car and Torpedo, 6 cyl., 38 H. P. (Air Cooled) 3,500
Limousine and Landaulet, 6 cyl., 38 H. P. (Air Cooled) 4,400
Touring Car, 4 cyl., 25 H. P. (Air Cooled) 2,700
Limousine and Landaulet, 4 cyl., 25 H. P. (Air Cooled) 3,500
Touring Car and Torpedo, 4 cyl., 18 H. P. (Air Cooled) 1,950

FRONTENAC—See Abendroth & Root Mfg. Co.

G. J. G. Motor Car Co., White Plains, N. Y. "Scout." "Pirate."
Touring Car, Runabout and Gunboat, 4 cyl., 38-42 H. P. $2,500
7 Passenger Touring Car, 4 cyl., 38-42 H. P. 2,750
Runabout, 4 cyl., 22 H. P. 1,000

GARFORD Co., Elyria, O.
(See page 55.)
Touring Car, 4 cyl., 30 H. P. $3,000
Limousine, 4 cyl., 30 H. P. 3,750
Touring Car, 4 cyl., 40 H. P. 3,500
Limousine, 4 cyl., 40 H. P. 4,750

GLEASON—See Kansas City Vehicle Co.

GLIDE—See Bartholomew Co.

Complete Index to Classification appears on Pages 8 to 22.

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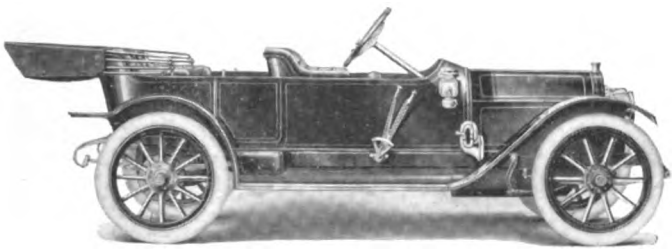
HUDSON "33"

"33" Touring Car $1250



"33" Pony Tonneau $1300

The "33" Torpedo, $1350

Equipment on all models includes 3 oil and two gas lamps, horn, tools, pump, quick detachable rims, gas generator. Mohair top, Prest-o-lite tank instead of gas generator and Duplex system ignition, with famous Bosch high tension Magneto, $150 extra for either model.

687 SOLD THE FIRST DAY
Reserve Your Hudson Now

The first day's sales made to individuals by Hudson dealers—on the day when the new HUDSON "33" arrived—totaled 687 cars.

Three-quarters of a million dollars' worth of automobiles sold the first day!

There has not been a day since that orders for immediate delivery were not far in excess of our output. At this writing—in mid-winter with a large section of the country covered with snow—we have unfilled orders for more cars wanted at once than we can produce in a month.

Judge what the demand will be in the spring.

You will see the necessity, if you want this car, of arranging a delivery date now.

Dealers cannot be given more cars than have already been arranged for. We are, in fact, compelled to reduce some of the allotments made for early delivery.

Our whole output was taken by dealers before the first car was shipped. Some dealers had sold half the cars they had arranged for before they had received a demonstrator.

The over-supply of low-priced cars last summer may have led some to think that good cars will be plentiful. But remember that the over-supply was of old model cars, displaced largely by the announcement of Howard E. Coffin's latest design—the new HUDSON "33."

The HUDSON "33" is his masterpiece.

Desirable cars are difficult to obtain when they are wanted.

The six leading makers, in all probability, will find it impossible to make prompt deliveries on all orders in May and June.

If you intend buying a car, begin your investigation at once and assure yourself of delivery when you want it. There will be no change in models or price.

Even cars that ordinarily have small demand will be in large demand in spring.

By taking your car now you can get three months' extra use without extra cost.

A 1910 car driven 15,000 miles can be sold, if you desire, with less sacrifice than a 1909 model used only half as much.

Therefore, get your 1911 model early. It can be resold in the fall to as great an advantage as if it were delivered in May.

The Coincidence of the "33"

The remarkable thing about the HUDSON "33" is the way the latest models of the greatest European cars resemble it. Leading engineers of Europe have just exhibited their newest designs at the Paris Automobile Show. Such famous makes as the Renault, Fiat, Mercedes, Isotta, Lancia, De Dietrich, Martini and many others, show identically the same ideas that Mr. Coffin, working independently of the European masters, put into the HUDSON "33."

Simplicity the Keynote

Simplicity is evident in every detail.

The number of parts used is 900 less than in the average car.

Oiling places can be reached without inconvenience or soiling the clothing.

Moving parts are all enclosed and dust-proof. This includes the valve mechanism, which is exposed in practically all American cars.

The frame is heavier than is used on any other car of its weight.

The motor and transmission are held together as a unit, giving all the advantages of both the three and four point system of suspension.

Wheels are stronger than are ordinarily used.

Springs are so designed that they are practically unbreakable, yet are easy and flexible.

There is greater leg room in the front seat than is provided in most cars.

The steering wheel is extra large—same as on the biggest, costliest cars.

Don't these facts make you want to see the HUDSON "33"?

Think what it means to obtain for $1250 the masterpiece of such an engineer as Howard E. Coffin.

Think what it means to obtain a car at that price that embodies the ideas that the leading European Engineers are this year putting on their cars, any one of which sells for from three to five times the price of the HUDSON "33."

Then think what is indicated by the 687 orders taken the first day.

Doesn't that look as though it would be hard to get prompt delivery of a HUDSON "33" in the spring?

Therefore reserve your HUDSON now.

Write for complete detailed descriptions and address of your nearest dealer.

See the Triangle on the Radiator

HUDSON MOTOR CAR COMPANY

LICENSED UNDER SELDEN PATENT

5057 Jefferson Ave., DETROIT

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

GREAT Western Automobile Co., Peru, Ind.
(See page 599.)
Touring Car and Baby Tonneau, 4 cyl., 40 H. P. $1,600
Fore Door Touring Car, 4 cyl., 40 H. P. 1,650
Torpedo, 4 cyl., 40 H. P. 1,750

HABERER & CO., Cincinnati, O. "Cino."
Touring Car, Pony Tonneau Roadster and Runabout, 4 cyl., 40 H. P. .. $2,250

HALLADAY—See Streator Motor Car Co.

HAYNES Automobile Co., 104 Main St., Kokomo, Ind.
(See page 43.)
Touring Car, Toy Tonneau and Roadster, 4 cyl., 35 H. P. $2,000
7-passenger Touring Car, 4 cyl., 50 H. P. 3,000

HERRESHOFF Motor Co., Detroit, Mich.
Runabout, 4 cyl., 24 H. P. $950
Touring Car, Runabout and Tourabout, 4 cyl., 24 H. P. 1,500

HUDSON Motor Car Co., 5057 Jefferson Ave., Detroit, Mich.
(See page 31.)
Roadster, 4 cyl., 26 H. P. $1,000
Touring Car, 4 cyl., 33 H. P. 1,250
Pony Tonneau, 4 cyl., 33 H. P. 1,300
Torpedo, 4 cyl., 33 H. P. 1,350

HUPMOBILE—See Hupp Motor Car Co.

HUPP Motor Car Co., Detroit, Mich. "Hupmobile."
Roadster, 4 cyl., 20 H. P. $750
Torpedo, 4 cyl., 20 H. P. 850
Touring Car, 4 cyl., 20 H. P. 900
Coupe, 4 cyl., 20 H. P. 1,100

IMPERIAL Automobile Co., Jackson, Mich.
Touring Car and Roadster, 4 cyl., 45 H. P. $2,000
Touring Car and Roadster, 4 cyl., 35 H. P. 1,650
Touring Car, 4 cyl., 30 H. P. 1,350

INDIANA Motor & Mfg. Co., Franklin, Ind. "Continental."
Touring Car, 4 cyl., 35 H. P. $1,400

INTERNATIONAL Harvester Co., Akron, O.
Buggy, 2 cyl., 14 H. P. (Air Cooled). $ ——
Surrey, 4 cyl., 30 H. P. ..... ——

INTER-STATE Automobile Co., Muncie, Ind.
Touring Car, Demi-Tonneau and Roadster, 4 cyl., 40 H. P. $1,750
Torpedo, 4 cyl., 40 H. P. 2,000
Fore Door Touring Car, 4 cyl., 50 H P. 2,700

JACK-RABBIT—See Apperson Bros. Automobile Co.

JACKSON Automobile Co., Jackson, Mich.
Roadster, 4 cyl., 28-30 H. P. $1,000
Touring Car, 4 cyl., 32-35 H. P. 1,700
Touring Car, 4 cyl., 36-40 H. P. 2,200
Touring Car, 4 cyl., 28-30 H. P. 1,250
Torpedo, 4 cyl., 30-32 H. P. 1,650

JEFFERY & Co., Thos. B., Kenosha, Wis. "Rambler."
Touring Car, 4 cyl., 34 H. P. $1,950
Touring Car and Toy Tonneau, 4 cyl., 45 H. P. 2,500
Touring Car, 4 cyl., 45 H. P. 2,750
Limousine, 4 cyl., 45 H. P. 4,200

KANSAS City Vehicle Co., Kansas City, Mo. "Gleason."
Roadster, 2 cyl., 20 H. P. $950
Baby Tonneau, 2 cyl., 20 H. P. 1,000

KELSEY Mfg. Co., C. W., Hartford, Conn.
Motorette, 2 cyl., 10 H. P. $385

KENMORE Mfg. Co., Chicago, Ill.
Runabout, 2 cyl., 12-14 H. P. $475
Roadster, 2 cyl., 16-18 H. P. 650

KISSEL KAR—See Kissel Motor Car Co.

KISSEL Motor Car Co., Hartford, Wis. "Kissel Kar."
Touring Car and Baby Tonneau, 4 cyl., 30 H. P. $1,500
Fore Door Touring Car, 4 cyl., 30 H. P. 1,600
Touring Car and Baby Tonneau, 4 cyl., 50 H. P. 2,000
Fore Door Touring Car, 4 cyl., 50 H. P. 2,100
Touring Car and Baby Tonneau, 6 cyl., 60 H. P. 2,500
Fore Door Touring Car, 6 cyl., 60 H. P. 2,600

KLINE-KAR—See B. C. K. Motor Car Co.

KNOX Automobile Co., Springfield, Mass.
Raceabout, 6 cyl., 60 H. P. $4,700
Limousine, 6 cyl., 60 H. P. 6,250
Touring Car and Torpedo, 6 cyl., 60 H. P. 5,000
Touring Car, 4 cyl., 40 H. P. 3,500
Raceabout, 4 cyl., 40 H. P. 3,200
Torpedo, 4 cyl., 40 H. P. 3,400
Limousine, 4 cyl., 40 H. P. 4,250

KOEHLER, Co., H. J., New York, N. Y.
Torpedo, 4 cyl., 40 H. P. $1,650

K-R-I-T Motor Car Co., E. Grand Blvd., Detroit, Mich.
Runabout, 4 cyl., 22.5 H. P. . $800 and 1,200
Roadster, 4 cyl., 22.5 H. P. 825
Surrey, 4 cyl., 22.5 H. P. 850
Coupe, 4 cyl., 22.5 H. P. 1,275

LAMBERT—See Buckeye Mfg. Co.

LEXINGTON Motor Car Co., Connersville, Ind.
Touring Car and Roadster, 4 cyl., 40 H. P. $1,650
Torpedo, 4 cyl., 40 H. P. 1,775
Touring Car, 4 cyl., 40 H. P. 1,850
Touring Car., 4 cyl., 45 H. P. 2,500

LION Motor Sales Co., 668 Woodward Ave., Detroit, Mich.
(Page 761.)
Runabout, 4 cyl., 40 H. P. $1,450
Touring Car, 4 cyl., 40 H. P. 1,500
Baby Tonneau, 4 cyl., 40 H. P. 1,475
Fore Door Touring Car, 4 cyl., 40 H. P. 1,600

LOCOMOBILE Co. of America, Bridgeport, Conn.
Touring Car and Baby Tonneau, 4 cyl., 30 H. P. $3,500
Torpedo, 4 cyl., 30 H. P. 3,700
Limousine, 4 cyl., 30 H. P. 4,600
Landaulet, 4 cyl., 30 H. P. 4,700
Touring Car and Torpedo, 6 cyl., 48 H. P. 4,800
Limousine, 6 cyl., 48 H. P. 6,050
Landaulet, 6 cyl., 48 H. P. 6,150

LOZIER Motor Co., Detroit, Mich.
Touring Car, Briarcliff and Lakewood, 6 cyl., 51 H. P. $5,500
Limousine and Landaulet, 6 cyl., 51 H. P. 7,000
Touring Car, Briarcliff and Lakewood, 4 cyl., 46 H. P. 4,600
Limousine and Landaulet, 4 cyl., 46 H. P. 6,000

McFARLAN Motor Car Co., Connersville, Ind.
Touring Car, Torpedo and Runabout, 6 cyl., 35-40 H. P. $2,100
Touring Car, Torpedo and Runabout, 6 cyl., 50-60 H. P. 2,500

McINTYRE Co., W. H., Auburn, Ind.
Touring Car, 2 cyl., 20 H. P. $850
Touring Car and Roadster, 4 cyl., 30 H. P. 1,350
Touring Car, 4 cyl., 40 H. P. 1,650
Torpedo, 4 cyl., 40 H. P. 1,850

Complete Index to Classification appears on Pages 8 to 22.

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Pullman
AUTOMOBILES

By Right of Conquest—
True Leaders

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The Success of the Average Automobile Dealer is 100 per Cent. Dependent Upon the Car He Sells, and if He Sells the Right Car He is Naturally 100 Per Cent. Independent, Because His Business Prospers.

FROM the standpoint of mentality, automobile dealers are divided into two classes—pessimists and optimists.

The pessimist (always the fellow who has picked the wrong car) wears a long face and tells you confidentially that the automobile business is going to the bow-wows—that the supply of cars greatly exceeds the demand—that prices have gone to smash and that there is no money in the business any way.

The optimist—the dealer who has picked the right car—is making sales faster than the factory is able to fill his orders. His chief quarrel with the fates lies only in his inability to get cars fast enough to meet demand.

An automobile rightly made and rightly priced can pull an obscure dealer out of obscurity—per contra the mediocre car at any old price can send the most popular and successful dealer back in the ranks of the "has-beens."—

The whole matter hinges on the character of the car the dealer chooses to represent and the integrity of purpose back of the manufacturer of that car. This has been proved so often that it requires no further comment here.

The automobile business has never been in a more prosperous condition than it is to-day. Men who know—and they are the ones who are investing millions to further expand the industry—will tell you that the surface has only been scraped, and that the man who conducts his business on a business basis in the matter of selling a car which is known and appreciated, need never worry over the future.

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This picture is not overdrawn, nor are we stretching a point in order to exaggerate existing conditions. The whole matter is an open book to those who know, and the only ones who do not understand are those who have tied themselves up to concerns that manufacture cars of little or no reputation—even worse, to manufacturers who are giving a "black eye" to the industry through the production of worthless and inefficient automobiles.

We call attention here to the fact that within the past two years The Pullman Motor Car Company has lost but TWO dealers, and in neither instance was the Pullman car or the Pullman policy at fault.

It is an uncontrovertible fact that Pullman dealers are successful—simply because they are selling their customers products of known and tested worth—products that have proved over and over every advertised claim made for them. Going still further, every Pullman car in the territory represented by a Pullman dealer is a rolling advertisement for that dealer. The right car helps sell itself.

Some Pullman agents sell as many as 200 Pullman cars each year. A large number sell from 50 to 100. Most of our agents have represented us from four to six years, and up until this time we have made no special effort to secure more dealers on account of formerly existing conditions which have limited our output.

IMPORTANT—Increased factory facilities now permit us to accept a few more GOOD AGENTS primarily to take care of the ever-increasing demand for our present models and ultimately to distribute the 3,000 Pullman cars which we shall build in 1912.

To any dealer who is open to conviction, we will only say—in all of our experience as manufacturers, we have yet to find a Pullman dealer who is not able to sell all of the cars he can get. We are prepared to prove this statement.

THE PULLMAN MOTOR CAR CO.

YORK, PA.

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The Factory Behind the Car

¶ The Pullman Factory was first put into operation eight years ago. The picture above shows it in its present state of advanced development.

¶ The determination of its founders at the start to Build The Best Car Possible has been responsible for the erection of one addition after another to the Pullman Plant.

¶ This policy of Building The Best Car Possible has borne its fruit, and to-day we point with pride to this, one of the most complete automobile plants in America.

Pullman Motor Car Co.,
York, Pa.

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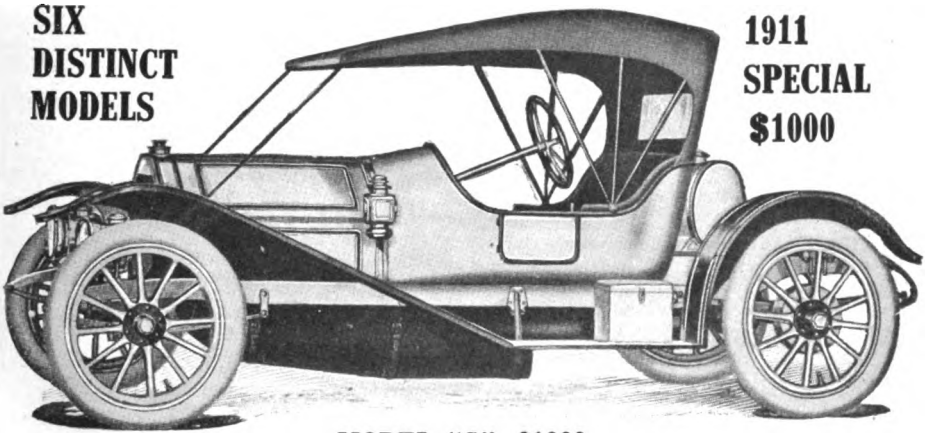
De TAMBLE

SIX DISTINCT MODELS

1911 SPECIAL $1000



MODEL "G", $1000

The line for 1911 includes the following:—

Model "B" Roadster, three passenger, two cylinder, listing at $650.00, as per enclosed circular.

Model "G," two passenger torpedo, four cylinder, listing at $1000.00. It has a 36 h. p. unit power plant, cylinders cast in pairs, 4¼x4½, self-contained oiling system by force pump flowing to a constant level, thence overflowing to reservoir in crank case; cooling system is through vertical tube type radiator, circulation being maintained by centrifugal pump; the clutch is of the multiple disc type, having twenty-four dry steel discs, being enclosed in fly wheel; transmission, selective type sliding gear, three speed forward and reverse; the unit power plant is hung on four point suspension; intake and exhaust manifold located on left side of motor, magneto on right; lower half of crank case is removable and permits of easy inspection and adjustment of crank shaft, main bearing connecting rods, etc.; wheel base is 115 inches, wheels 34 inches, tires 3½ inches; front axle is of standard "I" beam construction with ball-bearing, rear semi-floating type. This car is equipped with an all metal body, built in one unit with shroud and storm doors and has a large oval gasoline tank behind the seat.

Model "H," five passenger open touring car, listing at $1150.00. This car has the same chassis construction as the Model "G" Roadster, it being equipped with a straight line open touring body.

Model "J," torpedo, listing at $1200.00. This car also has the same chassis construction as the Model "G" Roadster, and is equipped with a straight line closed front torpedo body of five passenger capacity.

Model "K," seven passenger, listing at $1650.00. This car also has the same chassis construction as the Model "G" Roadster, and is equipped with a straight line closed front torpedo body. Also top, wind shield, and two extra individual seats.

The De Tamble Motors Company

ANDERSON, INDIANA

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

MARATHON—See Southern Motor Works.

MARION Motor Car Co., Indianapolis, Ind.
Roadster, 4 cyl., 30 H. P.....$1,150
Fore Door Touring Car and Torpedo Roadster, 4 cyl., 30 H. P..... 1,200
Torpedo Roadster, 4 cyl., 40 H. P..... 1,650
Fore Door Touring Car, 4 cyl, 40 H. P. 1,700

MARMON—See Nordyke & Marmon Co.

MARQUETTE Motor Co., Saginaw, Mich.
Touring Car and Runabout, 4 cyl, 45-50 H. P.....$4,250
Limousine and Landaulet, 4 cyl., 45-50 H. P..... 5,500

MATHESON Automobile Co., Wilkes-Barre, Pa.
Touring Car, Toy Tonneau and Speedster, 6 cyl., 50 H. P.....$3,500
Fore Door Touring Car, 6 cyl., 50 H. P. 3,750
7-Passenger Fore Door Touring Car, 6 cyl., 50 H. P..... 4,000
Limousine and Landaulet, 6 cyl., 50 H. P. 4,700
Touring Car, 4 cyl., 45-50 H. P..... 5,000
Limousine and Landaulet, 4 cyl., 45-50 H. P..... 5,750

MAXWELL-BRISCOE Motor Co., Tarrytown, N. Y.
(See page 779.)
Runabout, 2 cyl., 16 H. P..... $600
Standard Runabout, 4 cyl., 22 H. P... 750
Touring Car, 4 cyl., 22 H. P..... 800
Touring Car and Roadster, 4 cyl., 30 H. P..... 1,400
Touring Car, 4 cyl, 25 H. P..... 950

MAYTAG-MASON Motor Co., Waterloo, Ia.
(See page 761.)
Touring Car, 2 cyl., 24 H. P.....$1,150
Touring Car, Roadster and Close-Coupled, 4 cyl., 35 H. P..... 1,650
Fore Door Touring Car, 4 cyl, 35 H. P..... 1,750

MERCER Automobile Co., Trenton, N. J.
Touring Car, Toy Tonneau and Speedster, 4 cyl., 28.9 H. P.....$2,150

METZGER Motor Car Co., Detroit, Mich.
"Everitt 30."
Touring Car and Demi-Tonneau, 4 cyl., 30 H. P.....$1,350

MIDDLEBY Auto Co., Reading, Pa.
Touring Car and Toy Tonneau, 4 cyl., 25 H. P. (Air Cooled).....$1,100
Runabout, 4 cyl., 25 H. P. (Air Cooled) 850
Surrey, 4 cyl., 25 H. P. (Air Cooled). 1,000
Touring Car and Roadster, 4 cyl., 40 H. P..... 1,250

MIDLAND Motor Co., Moline, Ill.
Roadster, 4 cyl., 40 H. P.....$1,950
Fore Door Touring Car and Toy Tonneau, 4 cyl., 40 H. P..... 2,100
Touring Car and Demi-Tonneau, 4 cyl., 50 H. P..... 2,250

MITCHELL-LEWIS Motor Co., Racine, Wis.
(See page 41.)
Runabout, 4 cyl., 30 H. P.....$1,200
Surrey, 4 cyl., 30 H. P..... 1,250
Touring Car, 4 cyl., 30 H. P..... 1,500
Touring Car, 6 cyl., 50 H. P..... 2,250

MOLINE Automobile Co., Keokuk St., (East Moline) Moline, Ill.
(See page 765.)
Toy Tonneau, 4 cyl., 35 H. P.....$1,600
Touring Car, 4 cyl., 35 H. P..... 1,650
Fore Door Toy Tonneau, 4 cyl., 35 H. P. 1,700

MOON Motor Car Co., Main & Cornelia Sts., St. Louis, Mo.
(See page 57.)
Touring Car, Roadster and Baby Tonneau, 4 cyl., 30 H. P.....$1,500
Touring Car, Roadster and Baby Tonneau, 4 cyl., 45 H. P..... 3,000

NATIONAL Motor Vehicle Co., Indianapolis, Ind.
Touring Car, Toy Tonneau and Roadster, 4 cyl., 40 H. P.....$2,500
Fore Door Touring Car and Toy Tonneau, 4 cyl., 40 H. P..... 2,600
Torpedo, 4 cyl., 40 H. P..... 2,800
7-Passenger Fore Door Touring Car, 4 cyl., 40 H. P..... 3,000

NORDYKE & Marmon Co., Indianapolis, Ind. "Marmon."
Roadster, Suburban and Touring Car, 4 cyl., 32-40 H. P.....$2,750

NYBERG Automobile Works, 2437 Michigan Ave., Chicago, Ill.
(See page 47.)
Second-hand cars.

OAKLAND Motor Car Co., Pontiac, Mich.
Fore Door Touring Car, 4 cyl., 40 H. P. $1,600
Runabout, 4 cyl., 30 H. P..... 1,000
Toy Tonneau, 4 cyl., 30 H. P..... 1,150
Torpedo, 4 cyl., 30 H. P..... 1,200

OHIO Motor Car Co., Cincinnati, O.
Touring Car, Close Coupled and Roadster, 4 cyl., 35-40 H. P.....$2,150
Torpedo, 4 cyl., 35-40 H. P..... 2,450

OLDS Motor Works, Lansing, Mich. "Oldsmobile."
Touring Car and Roadster, 4 cyl., 36 H. P. $3,000
Touring Car and Roadster, 4 cyl., 40 H. P. 3,500
Touring Car and Roadster, 6 cyl., 60 H. P. 5,000

OLDSMOBILE—See Olds Motor Works.

OTTO Gas Engine Works, Philadelphia, Pa.
Touring Car, 4 cyl., 30-35 H. P.....$2,000

PACKARD Motor Car Co., Detroit, Mich.
Runabout or Close Coupled, 4 cyl., 18 H. P.....$3,200
Fore Door Limousine, 4 cyl., 18 H. P. 4,600
Fore Door Landaulet, 4 cyl., 18 H. P. 4,700
Coupe, 4 cyl., 18 H. P..... 3,900
Touring Car, Phaeton, Runabout or Close Coupled, 4 cyl., 30 H. P..... 4,200
Fore Door Limousine, 4 cyl., 30 H. P. 5,650
Fore Door Landaulet, 4 cyl., 30 H. P. 5,750
Brougham, 4 cyl., 30 H. P..... 5,400
Coupe, 4 cyl., 30 H. P..... 4,900

PAIGE-DETROIT Motor Car Co., 300-10 21st St., Detroit, Mich.
(See page 761.)
Roadster, 3 cyl., 25 H. P. (2 cycle).. $800
Roadster, 4 cyl., 25 H. P..... 800
Coupe, 4 cyl., 25 H. P..... 1,250

PALMER & Singer Mfg. Co., Long Island City, N. Y.
Landaulet, 4 cyl., 32.8 H. P.....$3,750
Limousine, 4 cyl., 32.8 H. P..... 3,650
5-Passenger Touring Car, 4 cyl., 32.8 H. P..... 1,900
5-Passenger Touring Car, 4 cyl., 50 H. P. 3,500
5-Passenger Touring Car, 6 cyl., 40 H. P. 3,300
5-Passenger Touring Car, 6 cyl., 60 H. P. 4,000
7-Passenger Touring Car, 6 cyl., 60 H. P. 4,200
7-Passenger Touring Car, 4 cyl., 50 H. P. 3,900
Limousine, 6 cyl., 40 H. P..... 4,050
Landaulet, 6 cyl., 40 H. P..... 4,150

PATERSON Co., W. A., Flint, Mich.
Touring Car, 4 cyl., 30 H. P.....$1,295
Fore Door Touring Car, 4 cyl., 30 H. P. 1,425
Roadster, 4 cyl., 30 H. P..... 1,200

Complete Index to Classification appears on Pages 8 to 22.

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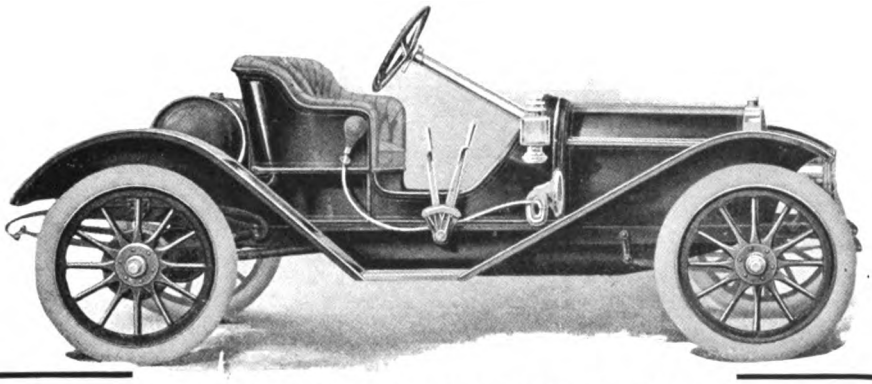


White Star, 4 Cylinder, 22 H.P. Roadster, $800

White Star

Automobiles Are Standard

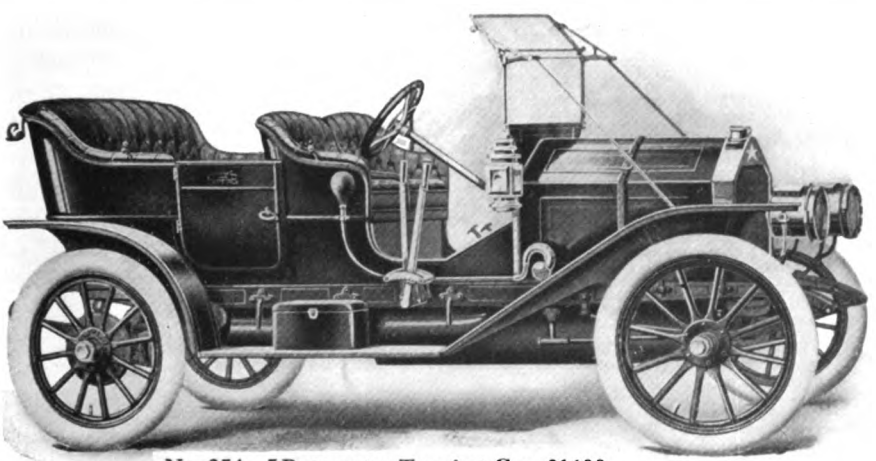
and worth just what we ask for them

35 H. P. —$1600—$1700—$1750. 22 H. P.—$800.

Built in the South for use over all the world. Back of **White Star** Automobiles is the standing and reputation of one of the oldest and most reliable firms in the entire South.

Every detail carefully watched to make this a most profitable agency proposition—Right price, prompt deliveries, thorough and dependable guarantee with no strings attached. Our advertising campaign will create sales for you.

ATLANTA MOTOR CAR COMPANY, Atlanta, Ga.



No. 35A. 5 Passenger Touring Car, $1600

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

Touring Car, 4 cyl., 40 H. P.....$1,550
Fore Door Touring Car, 4 cyl., 40 H. P. 1,600

PEERLESS Motor Car Co., Cleveland, O.
Touring Car, Pony Tonneau, Roadster, Torpedo and Close Coupled, 4 cyl., 30 H. P.....$4,300
Limousine, 4 cyl., 30 H. P..... 5,400
Touring Car, Close Coupled, Roadster, Pony Tonneau and Torpedo, 6 cyl., 50 H. P..... 6,000
Limousine, 6 cyl., 50 H. P..... 7,000
Landaulet, 6 cyl., 50 H. P..... 7,100
Limousine, 4 cyl., 20 H. P..... 4,200
Landaulet, 4 cyl., 20 H. P..... 4,300
Landaulet, 4 cyl., 30 H. P..... 5,500

PENNSYLVANIA Auto Motor Co., Bryn Mawr, Pa.
Toy Tonneau and Touring Car, 4 cyl., 28.9 H. P.....$2,000
Toy Tonneau and Touring Car, 4 cyl., 50 H. P..... 3,000
7-Passenger Touring Car, 4 cyl., 50 H. P. 3,500
Toy Tonneau, 6 cyl., 75 H. P..... 4,500
7-passenger Touring Car, 6 cyl., 75 H. P. 4,700

PETREL Motor Car Co., Milwaukee, Wis.
(See page 597.)
Fore Door Runabout, 4 cyl., 22 H. P.. $850
Fore Door Touring Car, 4 cyl., 22 H. P. 1,000
Runabout, 4 cyl., 30 H. P..... 1,350
Touring Car and Toy Tonneau, 4 cyl., 30 H. P..... 1,500
Fore Door Touring Car and Torpedo, 4 cyl., 40 H. P..... 1,600

PIERCE-ARROW Motor Car Co., Buffalo, N. Y.
Runabout and Miniature Tonneau, 6 cyl., 66 H. P.....$5,850
Touring Car and Close Coupled, 6 cyl., 66 H. P..... 6,000
Suburban, 6 cyl., 66 H. P..... 7,100
Landau, 6 cyl., 66 H. P..... 7,200
Runabout, 6 cyl., 36 H. P..... 4,000
Miniature Tonneau, 6 cyl., 36 H. P... 4,000
Brougham, 6 cyl., 36 H. P..... 4,900
Landaulet, 6 cyl., 36 H. P..... 5,000
Touring Car, 6 cyl., 36 H. P..... 4,000
Suburban, 6 cyl., 48 H. P..... 6,100
Runabout and Miniature Tonneau, 6 cyl., 48 H. P..... 4,850
Touring Car and Close Coupled, 6 cyl., 48 H. P..... 5,000
Landau, 6 cyl., 48 H. P..... 6,200

PIERCE-RACINE—See Case Threshing Machine Co.

POPE-HARTFORD—See Pope Mfg. Co.

POPE Mfg. Co., Hartford, Conn. "Pope-Hartford."
Touring Car, Pony Tonneau and Roadster, 4 cyl., 50 H. P.....$3,000
7-Passenger Touring Car, 4 cyl., 50 H. P. 3,250
Limousine and Landaulet, 4 cyl., 50 H. P..... 4,150
7-Passenger Touring Car, Pony Tonneau and Roadster, 6 cyl., 50 H. P.. 4,000

PRATT-ELKHART—See Elkhart Carriage & Harness Mfg. Co.

PREMIER Motor Mfg. Co., Indianapolis, Ind.
Touring Car, Toy Tonneau and Roadster, 4 cyl., 40 H. P.....$3,000
Touring Car, Toy Tonneau and Roadster, 6 cyl., 60 H. P..... 3,500
Limousine, 4 cyl., 40 H. P..... 4,200
Limousine, 6 cyl., 60 H. P..... 5,000

PULLMAN Motor Car Co., York, Pa.
(See pages 33, 34, 35 and 36.)
Touring Car, Roadster and Toy Tonneau, 4 cyl., 35 H. P.....$2,000
Touring Car, 4 cyl., 50 H. P..... 3,500
Toy Tonneau and Roadster, 4 cyl., 30 H. P..... 1,650

RAMBLER—See Jeffery & Co.

REGAL Motor Car Co., Detroit, Mich.
Touring Car, 4 cyl., 30 H. P.....$1,000
Fore Door Touring Car and Demi-Tonneau, 4 cyl., 30 H. P..... 1,050
Coupe, 4 cyl., 30 H. P..... 1,650
Limousine, 4 cyl., 30 H. P..... 1,850
Touring Car, 4 cyl., 40 H. P..... 1,650
Runabout, 4 cyl., 20 H. P..... 900

REO Motor Car Co., Lansing, Mich.
Touring Car and Toy Tonneau, 4 cyl., 30-35 H. P.....$1,250
Limousine and Landaulet, 4 cyl., 30-35 H. P. 2,000
Fore Door Touring Car, 4 cyl., 30-35 H. P. 1,350
Torpedo Roadster, 4 cyl., 30-35 H. P.. 1,050

REPUBLIC Motor Car Co., Hamilton, O.

ROADER Car Co., Brockton, Mass.
(See page 57.)
Runabout, 4 cyl., 20 H. P..... $650

ROYAL Tourist Car Co., Cleveland, O.
(See page 41.)
Touring Car, 4 cyl., 50 H. P.....$4,500

S. G. V.—See Acme Motor Car Co.

ST. Louis Car Co., St. Louis, Mo. "Standard Six."
Miniature Tonneau, Touring Car and Roadster, 6 cyl., 50 H. P.....$3,000

SAMPSON Mfg. Co., Alden, Detroit Mich.
Fore Door Touring Car, 4 cyl., 30-35 H. P.....$1,325

SCHACHT Motor Car Co., 2780 Spring Grove Ave., Cincinnati, O.
(See page 597.)
Touring Car, 4 cyl., 35-40 H. P.....$1,435

SEBRING Motor Car Co., Sebring, Ohio.
Touring Car, Torpedo, Cross Country and Toy Tonneau, 6 cyl., 35-40 H. P. $2,750
Touring Car, 6 cyl., 60 H. P..... 3,500

SELDEN Motor Vehicle Co., Rochester, N. Y.
Touring Car, 4 cyl., 36 H. P.....$2,250
Fore Door Roadster and Torpedo, 4 cyl., 36 H. P..... 2,500
Fore Door 7-Passenger Touring Car and Torpedo, 4 cyl., 36 H. P..... 2,600

SIMPLEX Automobile Co., New York, N. Y.
(And Body), 4 cyl., 38 H. P. (Chassis).$4,000
(Any Body), 4 cyl., 50 H. P. (Chassis). 4,500
(Any Body), 4 cyl., 90 H. P. (Chassis) 5,350

SIMPLEX Motor Car Co., Mishawaka, Ind. "Amplex."
Touring Car, Roadster and Close Coupled, 4 cyl., 30-50 H. P. (2 cycle) $4,300
Limousine, 4 cyl., 30-50 H. P (2 cycle) 5,650

SMITH Automobile Co., Topeka, Kans. "Great Smith."
Touring Car, 4 cyl., 45 H. P.....$2,650
Toy Tonneau, 4 cyl., 45 H. P..... 2,500
Roadster, 4 cyl., 45 H. P..... 2,250

SOUTHERN Motor Works, Nashville, Tenn. "Marathon."
(See page 29.)
Touring Car, Torpedo and Roadster, 4 cyl., 35 H. P.....$1,500

SPEEDWELL Motor Car Co., Dayton, O.
Roadster, 4 cyl., 50 H. P.....$2,500
Toy Tonneau, 4 cyl., 50 H. P..... 2,625
5-Passenger Touring and Close Coupled, 4 cyl., 50 H. P..... 2,650
Torpedo and Toy Tonneau (Fore-door), 4 cyl., 50 H. P..... 2,700
5-Passenger Touring (Fore-door), 4 cyl., 50 H. P..... 2,750

Complete Index to Classification appears on Pages 8 to 22.

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The Consolidated Motor Car Co.

ROYAL TOURIST **CROXTON**

Offer The Most Complete Line of
Motor Vehicle Equipment Ever Produced

French Ratings - - All Body Designs

FIFTEEN H.P.
TWENTY H.P.
TWENTY-FIVE H.P.
THIRTY H.P.
THIRTY-FIVE H.P.
FORTY-FIVE H.P.

$100.00 per Horse Power

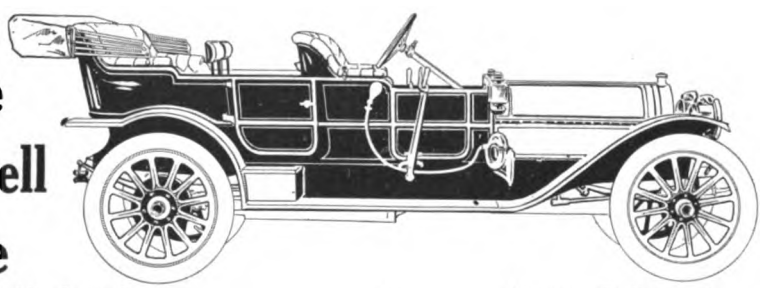
Motor Cars **Taxicabs** **Trucks**

The Consolidated Motor Car Co.

ROYAL TOURIST **Capital $4,000,000.00** **CROXTON**

CLEVELAND

The Mitchell Line



The Mitchell Six Cylinder seven passenger touring car at $2,250. Fully equipped with magneto, top, five lamps, generator, horn and complete set of tools, including jack. Wheel base is 130 inches.
The Mitchell "T" five passenger touring car at $1,500. Fully equipped with magneto, top, horn, generator, five lamps, complete set of tools, including jack. Wheel base is 115 inches.
The Mitchell "R" three passenger roadster at $1,200. Fully equipped with magneto, top, horn, generator, five lamps and complete set of tools, including jack. Wheel base is 100 inches. With double rumble seat $50 extra.
This is the best selling line of popular priced cars on the market and able to repeat oftener than any other line. Backed, as they are, by the Mitchell Make-Good policy, they constitute the very finest proposition an agent can possibly have.

ALL PRICES F.O.B. RACINE

Mitchell-Lewis Motor Co.
Racine, Wis. U.S.A.

MEMBERS OF A.L.A.M · LICENSED UNDER SELDEN PATENT

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

7-Passenger Touring, 4 cyl., 50 H. P..$2,800
7-Passenger Touring (Fore-door), 4 cyl., 50 H. P..... 2,900
Limousine, 4 cyl., 50 H. P..... 3,850

STANDARD SIX—See St. Louis Car Co.

STAVER Carriage Co., 76th & Wallace Sts., Chicago, Ill.
(See page 597.)

STEARNS Co., F. B., Cleveland, O.
Touring Car and Toy Tonneau, 4 cyl., 15-30 H. P.....$3,200
Limousine and Landaulet, 4-cyl., 15-30 H. P.....4,000 to 4,600
Touring Car and Toy Tonneau, 4 cyl., 30-60 H. P..... 4,600
Limousine, 4 cyl., 30-60 H. P..... 5,750
Landaulet, 4 cyl., 30-60 H. P..... 5,850

STEVENS-DURYEA Co., Chicopee Falls, Mass.
Touring Car, 6 cyl., 54.1 H. P.....$4,000
Fore Door Touring Car, 6 cyl., 54.1 H. P. 4,150
Limousine, 6 cyl., 54.1 H. P..... 5,150
Touring Car, Fore Door Touring Car and Roadster, 6 cyl., 43.8 H. P..... 3,500
Torpedo, 6 cyl., 43.8 H. P..... 3,600
Limousine, 6 cyl, 43.8 H. P..... 4,600
Landaulet, 6 cyl, 43.8 H. P..... 4,800
Touring Car and Roadster, 4 cyl., 36.1 H. P. 2,850
Limousine, 4 cyl., 36.1 H. P..... 4,000

STODDARD-DAYTON—See Dayton Motor Car Co.

STREATOR Motor Car Co., Streator, Ill.
"Halladay."
(See page 765.)
Runabout, 4 cyl., 30 H. P.....$1,150
Touring Car, 4 cyl., 30 H. P..... 1,250
Roadster, 4 cyl., 30 H. P..... 1,500
Touring Car & Toy Tonneau, 4 cyl., 30 H. P..... 1,540
Coupe, 4 cyl., 30 H. P..... 2,000
Roadster, Toy Tonneau & Touring Car, 4 cyl., 40 H. P..... 1,700
Fore Door Touring Car, 4 cyl., 40 H. P. 1,800
Coupe 4 cyl., 40 H. P..... 2,250
Limousine, 4 cyl., 40 H. P..... 3,000
Landaulet, 4 cyl., 40 H. P..... 3,100
Roadster & Touring Car, 4 cyl., 50 H. P. 2,650
Fore Door Touring Car, 4 cyl., 50 H. P. 2,750
Coupe, 4 cyl., 50 H. P..... 3,500
Limousine, 4 cyl., 50 H. P..... 4,000
Landaulet, 4 cyl., 50 H. P..... 4,100

STUDEBAKER Corp., South Bend, Ind.
(See page 27.)
Touring Car, Speed and Tourabout, 4 cyl., 40 H. P.....$2,850
Limousine, 4 cyl., 40 H. P..... 3,750
Landaulet, 4 cyl., 40 H. P..... 3,800

STUDEBAKER-GARFORD—See Studebaker Automobile Co.

THOMAS FLYER—See Thomas Motor Co.

THOMAS Motor Co., E. R., Buffalo, N. Y.
"Thomas Flyer."
Touring Car and Flyabout, 6 cyl., 40 H. P. $3,750
Fore Door Touring Car & Flyabout, 6 cyl., 40 H. P..... 3,900
7-Passenger Touring Car, 6 cyl., 40 H. P..... 3,850
7-Passenger, Fore Door Touring Car, 6 cyl., 40 H. P..... 4,000
Limousine, 6 cyl., 40 H. P..... 5,000
Landaulet, 6 cyl., 40 H. P..... 5,100
Brougham, 4 cyl., 28 H. P..... 4,000
Limousine, 4 cyl., 28 H. P..... 4,100
Landaulet, 4 cyl., 28 H. P.....$4,250
Touring Car, Flyabout and Tourabout, 6 cyl., 70 H. P..... 6,000
Limousine, 6 cyl., 70 H. P..... 7,500
Landaulet, 6 cyl., 70 H. P..... 7,600

VANDEWATER & Co., Elizabeth, N. J.
"Correja."
Runabout, 4 cyl., 35 H. P.....$1,450
Touring Car, 4 cyl., 35 H. P..... 1,650

VELIE Motor Car Co., Chicago, Ill.
(See page 55.)
Touring Car, Roadster and Toy Tonneau, 4 cyl., 40 H. P.....$2,000
Torpedo Roadster, 4 cyl., 40 H. P..... 1,900
Coupe, 4 cyl., 40 H. P..... 2,350
Limousine, 4 cyl., 40 H. P..... 3,000

VICTOR Motor Car Co., St. Louis, Mo.
Fore Door Touring Car, 4 cyl., 40 H. P. $2,000
Touring Car, 4 cyl., 40 H. P..... 1,750
Surrey, 4 cyl., 30 H. P..... 1,250
Runabout, 2 cyl., 20 H. P..... 950

WARREN Motor Car Co., Detroit, Mich.
Roadster, 4 cyl., 30 H. P.....$1,200
Demi-Tonneau, 4 cyl., 30 H. P..... 1,300
Touring Car and Fore Door Roadster, 4 cyl., 30 H. P..... 1,325
Torpedo and Fore Door Touring Car, 4 cyl., 30 H. P..... 1,500
Coupe, 4 cyl., 30 H. P..... 1,750

WASHINGTON—See Carter Motor Car Corp.

WAYNE Works, Richmond, Ind.
Roadster, 4 cyl., 22 H. P. (Air Cooled) $975
Touring Car, 26 H. P. (Air Cooled).. 1,225
Roadster, 4 cyl., 26 H. P..... 1,000
Touring Car, 4 cyl., 26 H. P..... 1,275

WELCH Motor Car Co., Pontiac, Mich.
Touring Car, 4 cyl., 50 H. P.....$4,500
Touring Car, 6 cyl., 75 H. P..... 6,000

WESTCOTT Motor Car Co., Richmond, Ind.
Touring Car, 4 cyl., 40 H. P.....$2,000
5-Passenger Fore Door Touring Car, 4 cyl., 45-50 H. P.....2,100
7-Passenger Fore Door Touring Car, 4 cyl., 45-50 H. P. 2,250

WHITE Co., Cleveland, O.
Limousine, 4 cyl., 30 H. P.....$3,600
Landaulet, 4 cyl., 30 H. P..... 3,800
Touring Car and Detachable Toy Tonneau, 4 cyl., 30 H. P..... 2,000
5-Passenger Torpedo, 4 cyl., 40 H. P.. 3,000
7-Passenger Torpedo, 4 cyl., 40 H. P.. 3,200

WHITE STAR—See Atlanta Motor Co.

WHITING Motor Car Co., Flint, Mich.
Touring Car, 4 cyl., 40 H. P.....$1,600
Roadster, 4 cyl., 20 H. P..... 750
Fore Door Touring Car, 4 cyl., 40 H. P. 1,700
Town Car, 4 cyl., 20 H. P..... 1,050

WILCOX Motor Car Co., Minneapolis, Minn.
Touring Car, Baby Tonneau and Roadster, 4 cyl., 30-40 H. P.....$1,500

WILLYS-OVERLAND Co., Toledo, O.
(See page 55.)
Roadster, 4 cyl., 20 H. P..... $775
Torpedo Roadster, 4 cyl., 20 H. P..... 850
Detachable Tonneau, 4 cyl., 20 H. P.. 900
Roadster, 4 cyl., 25 H. P..... 1,000
Fore Door Touring Car, 4 cyl., 25 H. P..... 1,095
Torpedo Roadster and Fore Door Touring Car, 4 cyl., 30 H. P..... 1,250
Fore Door Touring Car and Torpedo Roadster, 4 cyl., 40 H. P..... 1,600
Torpedo Touring Car, 4 cyl., 40 H. P. 1,675
Fore Door Touring Car, 4 cyl., 40 H. P..... 1,300
Fore Door Touring Car, 4 cyl., 40 H. P..... 1,450

WINTON Motor Carriage Co., Cleveland, O.
Touring Car, Runabout and Toy Tonneau, 6 cyl., 48 H. P.....$3,000

Complete Index to Classification appears on Pages 8 to 22.

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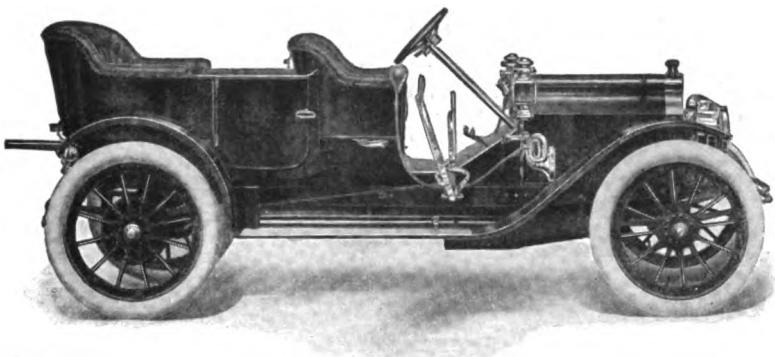
Dorris

Model F 1911



PRICE, $2500 FULLY EQUIPPED WITH

Top and Hood **Windshield**
Speedometer **Tire Carriers**
36″ Wheels—Continental Q. D. Demountable Rims

Dorris Motor Car Co. **St. Louis, Mo.**

The 1911 HAYNES Model 20 $2000

Is the only car of established reputation selling at a moderate price. It was built to fill a demand for a medium size car of ***known*** quality. A car that would be economical to run, easy to handle, and that would appeal to the man who is through experimenting and is looking for permanent satisfaction.

In building it we had in mind that the Haynes reputation must be maintained.

The price was a second consideration.

There is nothing left off or out of this Haynes to reduce its cost. It has the speed, power, dependability, comfort and appearance found only in the highest priced machines.

It is simply smaller, and consequently lighter, than our 7 passenger models that sell for $3000.

A Haynes at $2000 ought to interest ***anyone*** who is on the market for a car. Catalog on request.

HAYNES AUTOMOBILE COMPANY

104 MAIN STREET **KOKOMO, INDIANA**

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PLEASURE VEHICLES
(Continued)

GASOLINE VEHICLES (Continued)

Torpedo, 6 cyl., 48 H. P.....$3,250
Demi Limousine, 6 cyl, 48 H. P..... 4,000
Town Car, 6 cyl., 48 H. P..... 4,200
Limousine, 6 cyl., 48 H. P..... 4,250
Landaulet, 6 cyl., 48 H. P..... 4,500

WISCONSIN Motor Car Co., Janesville, Wis.
Touring Car and Baby Tonneau, 4 cyl., 35 H. P.....$1,750

ZIMMERMAN Mfg. Co., Auburn, Ind.
Touring Car, 4 cyl., 40 H. P.....$1,600
Fore Door Touring Car, 4 cyl., 40 H. P. 1,650
Torpedo, 4 cyl., 40 H. P..... 1,700
Torpedo Roadster, 4 cyl., 40 H. P..... 1,500
Runabout, 2 cyl., 16 H. P. (Air Cooled) 675
Surrey, 2 cyl., 16 H. P. (Air Cooled).. 775

ELECTRIC VEHICLES

ANDERSON Electric Car Co., Detroit, Mich. "Detroit."

BABCOCK Electric Carriage Co., Buffalo, N. Y.
Runabout $1,600
Victoria 1,900
Roadster 2,400
Coupe .....2,300 to 2,600
Town Car 3,250
Touring Car 3,800

BAILEY & Co., S. R., Amesbury, Mass.
(See page 53.)
Victoria-Phaeton .....$2,000 to 2,600

BAKER Motor Vehicle Co., Cleveland, O.
Runabout and Victoria.....$2,000
Roadster 2,500
2-Passenger Coupe..... 2,400
4-Passenger Coupe..... 2,600
Brougham 3,600
Surrey 2,200

BROC Electric Vehicle Co., Cleveland, O.
Stanhope $2,000
Roadster 2,100
Coupe 2,300
Victoria 2,050

COLUMBIA Motor Car Co., Hartford, Conn.
Victoria-Phaeton $1,600

COLUMBUS Buggy Co., Columbus, O.
Runabout .....$——
Phaeton ..... ——
Coupe ..... ——

DETROIT—See Anderson Electric Car Co.

FRITCHLE Automobile & Battery Co., Denver, Colo.
Victoria-Phaeton $2,000
Roadster 2,200
Coupe 3,000

HUPP-YEATS Electric Car Co., Detroit, Mich.
Coupe $1,750

IDEAL Electric Vehicle Co., 308 E. Huron St., Chicago, Ill.
(See page 53.)
Brougham $2,200

OHIO Electric Car Co., Toledo, O.

PHIPPS-GRINNELL Auto Co., Detroit, Mich.
Coupe $2,500

RAUCH & Lang Carriage Co., 2180 W. 25th St., Cleveland, O.
(See page 597.)
Runabout $2,100
Coupe .....2,200 to 2,550
Stanhope .....1,900 to 2,300
Extension Coupe.....$2,500 to 2,800
Victoria .....2,200 to 2,450

STUDEBAKER Corp., South Bend, Ind.
(See page 27.)
Victoria-Pheton $1,475
Coupe 1,750
Landaulet..... 1,850

WAVERLEY Co., Indianapolis, Ind.
Stanhope $1,600
Roadster 1,700
Coupe 2,150
Brougham .....2,400 and 2,600
Victoria-Phaeton 1,850

WOODS Motor Vehicle Co., Chicago, Ill.
(See page 53.)
Victoria $2,100
Brougham 2,900

STEAM VEHICLES

LANE Motor Vehicle Co., Poughkeepsie, N. Y.
Runabout, 20 H. P.....$1,350
Touring Car, 20 H. P..... 1,600

STANLEY Motor Carriage Co., Newton, Mass.
Runabout, 10 H. P.....$1,000
Touring Car, 20 H. P..... 1,500

WHITE CO., Cleveland, O.
Touring Car and Runabout, 20 H. P..$2,000
Limousine, 20 H. P..... 2,800
Landaulet, 20 H. P..... 3,300
Touring Car, Roadster and Toy Tonneau, 40 H. P..... 4,000
Limousine, 40 H. P..... 4,800
Landaulet, 40 H. P..... 5,000

COMMERCIAL VEHICLES

GASOLINE COMMERCIAL VEHICLES

(Unless otherwise mentioned, all cars are equipped with 4-cycle water-cooled motors.)

ABENDROTH & Root Mfg. Co., Newburgh, N. Y. "Frontenac."
3 Ton (Any Body), 4 cyl., 50 H. P. (Chassis) $3,500
4 Ton (Any Body), 4 cyl., 50 H. P. (Chassis) 3,650

ABRESCH-CRAMER Auto Truck Co., Milwaukee, Wis.
2000 lb. (Any Body) 4 cyl., 30 H. P...$2,000
4000 lb. (Any Body) 4 cyl., 36 H. P... 2,700
6000 lb. (Any Body) 4 cyl., 36 H. P... 3,000
8000 lb. (Any Body) 4 cyl., 45 H. P... 3,500
10000 lb (Any Body) 4 cyl., 60 H. P... 4,500

ACORN Motor Car Co., Cincinnati, O.
1000 lb. Panel, 2 cyl., 20 H. P.....$1,200
1000 lb. Express, 2 cyl., 20 H. P..... 1,150

ADAMS Bros. Co., Findlay, O.
(See pages 617 and 618.)
2000 lb. (Any Body) 4 cyl., 30 H. P...$2,150

ALCO—See American Locomotive Co.

AMERICAN Locomotive Co., Providence, R. I. "Alco."
3 Ton Truck, 4 cyl., 24 H. P. (Chassis) $3,400

AMERICAN Motor Truck Co., Findlay, O.
2 Ton (Any Body), 4 cyl., 40-45 H. P. .....(Chassis) $3,000
10,000 lb. (Any Body) 4 cyl., 60-65 H. P. .....(Chassis) 4,500
3½ Ton (Any Body), 4 cyl., 45-50 H. P. .....(Chassis) 3,750

ATTERBURY Motor Car Co., Buffalo, N. Y. "Buffalo."
1500 lb., Solid Panel or Express, 4 cyl., 20 H. P.....$1,600

Complete Index to Classification appears on Pages 8 to 20.

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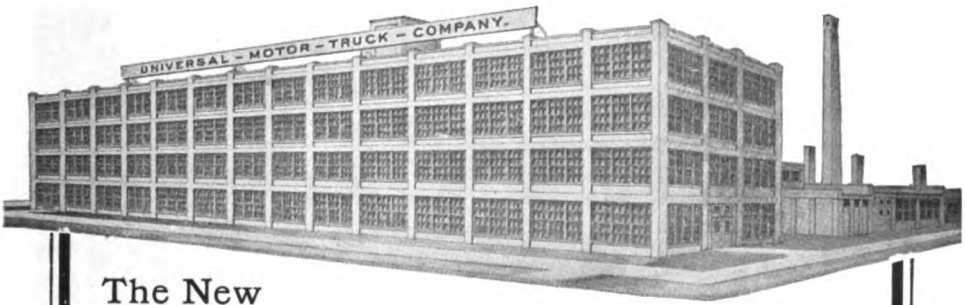


The New Plant of the Universal Motor Truck Co.

THE Universal Motor Truck Co. of Detroit, Michigan, announces the completion of its new quarter of a million dollar plant at Farnsworth, Theodore and Dequindre Streets.

Universal Motor Trucks will be made in 1½ ton and 3 ton sizes—deliveries begin March 1st.

The organization, though new, is composed of expert motor truck builders and business men who have already used and expect to continue to use a large number of commercial motor vehicles.

Their great financial stability, coupled with their thorough knowledge of standardized commercial motor vehicle manufacture make the product of this factory one in which the utmost confidence regarding efficiency and permanence may be placed.

Correspondence with dealers and business men interested is solicited.

"Built for Business by Business Men."

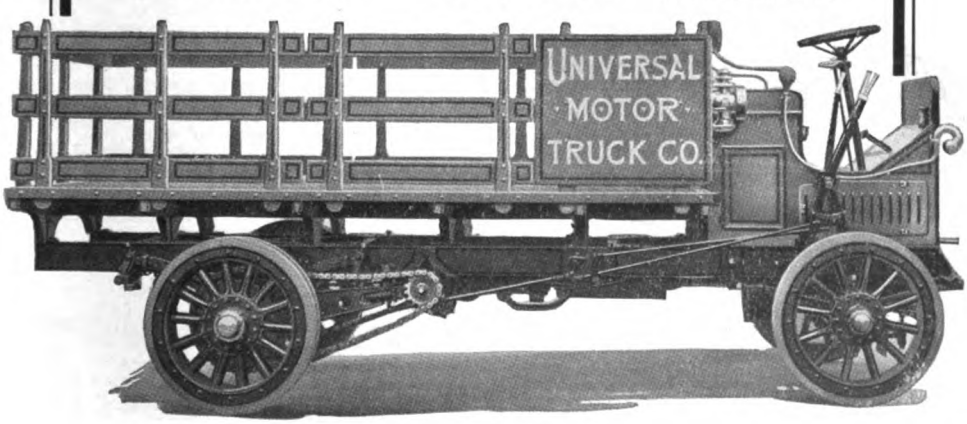
If Interested Use This Coupon

Universal Motor Truck Co.
506 Theodore St., Detroit, Mich.
Please send full information.
Name _____
Address _____

Universal Motor Truck Co.

506 Theodore Street, Detroit, Michigan

This is a photograph of the 3-ton truck.



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COMMERCIAL VEHICLES (Continued)

GASOLINE COMMERCIAL VEHICLES (Continued)

1½ Ton Express, 4 cyl., 30 H. P.....$2,500
2 Ton Truck, 4 cyl., 40 H. P..... 3,000
3 Ton Truck, 4 cyl., 50 H. P..... 3,500
5 Ton Truck, 4 cyl., 60 H. P..... 4,500

AUTOCAR Co., Ardmore, Pa.
3000 lb. (Any Body), 2 cyl., 13 H. P. ..... (Chassis) $2,150

B. C. K. Motor Car Co., York, Pa. "Kline Kar."
(See page 55.)
1250 lb. Close Delivery, 2 cyl., 16-20 H. P.....$1,450
1250 lb. Stake Body, 2 cyl., 16-20 H. P. 1,400
1250 lb. Express, 2 cyl., 16-20 H. P.... 1,425
1250 lb. Wagonette, 2 cyl., 16-20 H. P. 1,750

BRODESSER Motor Truck Co., Juneau, Wis.
2000 lb. (Any Body) 4 cyl., 24-26 H. P., ...(Chassis) $1,900
4000 lb. (Any Body) 4 cyl., 30-35 H. P. .....(Chassis) 2,000
6000 lb. (Any Body) 4 cyl., 40-45 H. P. .....(Chassis) 3,250

BRUSH Runabout Co., Detroit, Mich.
600 lb. Delivery Wagon, 1 cyl., 10 H.P. $685

BUCKEYE Wagon & Motor Car Co., Dayton, O.
2000 lb. Platform, 4 cyl., 25 H. P....$——

BUFFALO—See Atterbury Motor Car Co.

CARLSON Motor Vehicle Co. (Summerdale), Philadelphia, Pa.
(See page 599.)
6000 lb. Cage, 4 cyl., 30 H. P.....$3,500

CHASE Motor Truck Co., Syracuse, N. Y.
1000 lb. Express, 3 cyl., 15 H. P. (Air Cooled, 2 cycle) $900
1000 lb. Panel Top, 3 cyl., 15 H. P. (Air Cooled, 2 cycle)..... 1,050
1500 lb. Express, 3 cyl., 20 H. P. (Air Cooled, 2 cycle)..... 1,250
1500 lb. Panel Top, 3 cyl., 20 H. P. (Air Cooled, 2 cycle)..... 1,450
2000 lb. Express, 3 cyl., 20 H. P. (Air Cooled, 2 cycle) 1,400
4000 lb. Express, 3 cyl., 30 H. P. (Air Cooled, 2 cycle) 2,200

CHICAGO Pneumatic Tool Co., 1337 Michigan Ave., Chicago, Ill. "Little Giant."
(See page 49.)
1000 lb. to 1500 lb. Delivery, 2 cyl., 18-20 H. P.....$1,000 to 1,100

COMMER—See Wood Automobile Mfg. Co.

COUPLE-GEAR Freight-Wheel Co., Grand Rapids, Mich.
10,000 lb. (Any Body), 4 cyl., 40-50 H. P. $5,600
7000 lb. (Any Body), 4 cyl., 45-55 H. P 5,000

CROWN Commercial Car Co., 501 Broadway, Milwaukee, Wis.
(See page 47.)
1000 lb. Open Delivery, 2 cyl., 20 H. P. (Chassis) $1,000

DART Mfg. Co., Waterloo, Ia.
(See page 707.)
1000 lb. Open Delivery..... $650
1000 lb. Closed Delivery..... 690

DENNISTON Co., E. E., 184 W. Mohawk St., Buffalo, N. Y.
(See page 437.)
1000 lb. (Any Body), 2 cyl. 15 H. P..$2,000

ECONOMY Motor Car Co., Joliet, Ill.
1000 lb., 2 cyl., 16 H. P.....$——
2000 lb., 2 cyl., 22 H. P..... ——

F. C. S.—See Schmidt Bros. Co.

FRANKLIN Mfg. Co., H. H., Syracuse, N. Y.
1000 lb. Closed Delivery, 4 cyl., 20 H. P. (Air Cooled).....$2,350
2000 lb. Express, 4 cyl., 18 H. P., (Air Cooled) 2,400
2000 lb. Express, 4 cyl., 18 H. P. (Air Cooled) 2,500

FRAYER-MILLER—See Kelly Motor Truck Co.

GARFORD Co., Elyria, O.
(See page 55.)
2000 lb. (Any Body), 4 cyl., 26 H. P. .....(Chassis)$2,250
4000 lb. (Any Body), 4 cyl., 40 H. P. .....(Chassis) 2,850
6000 lb. (Any Body), 4 cyl., 40 H. P. .....(Chassis) 3,250

GLEASON—See Kansas City Vehicle Co.

GRABOWSKY Power Wagon Co., Detroit, Mich.
2000 lb. Screen Delivery, 2 cyl., 30-35 H. P. $2,300
2000 lb. Panel Delivery, 2 cyl., 30-35 H. P. 2,500
3000 lb. Stake, 2 cyl., 30-35 H. P..... 2,650
4000 lb. Stake or Side Rack, 2 cyl., 30-35 H. P..... 3,050
6000 lb. Stake or Side Rack, 2 cyl., 40-45 H. P..... 3,500
12 Passenger, 2 cyl., 30-35 H. P..... 2,600
16 Passenger, 2 cyl., 30-35 H. P..... 2,750
20 Passenger, 2 cyl., 30-35 H. P..... 3,200
25 Passenger, 2 cyl., 40-45 H. P..... 3,750

GRAMM Motor Car Co., Lima, O.
2 Ton (Any Body), 4 cyl., 35 H. P. .....(Chassis) $2,500
3 Ton (Any Body), 4 cyl., 50 H. P. .....(Chassis) 3,500
1 Ton (Any Body), 4 cyl., 25 H. P., ...(Chassis) 1,800
5 Ton (Any Body), 4 cyl., 50 H. P., ...(Chassis) 4,500

HARRISON Co., Robert, So. Boston, Mass.
7000 lb. (Any Body), 4 cyl., 35 H. P.. .....(Chassis) $3,500
10000 lb. (Any Body), 6 cyl., 60 H. P. .....(Chassis) 4,500
20000 lb. (Any Body), 6 cyl., 60 H. P., ...(Chassis) 5,700

IDEAL Auto Co., Fort Wayne, Ind.
1200 lb. Open, 2 cyl., 18 H. P.....$1,050
1600 lb. Open, 2 cyl., 20 H. P..... 1,250
2500 lb. Open, 2 cyl., 24 H. P..... 1,650
3000 lb. Open, 4 cyl., 30 H. P..... 1,900

KANSAS City Vehicle Co., Kansas City, Mo. "Gleason."
1000 lb. Open Express, 2 cyl., 20 H. P..$1,050
1000 lb. Solid Panel, 2 cyl., 20 H. P... 1,250

KELLY Motor Truck Co., Springfield, O. "Frayer-Miller."
2 Ton (Any Body), 4 cyl., 35 H. P. (Air Cooled).....(Chassis) $2,800
3 Ton (Any Body), 4 cyl., 35 H. P. Air Cooled).....(Chassis) 3,300

KLINE KAR—See B. C. K. Motor Car Co.

KNOX Automobile Co., Springfield, Mass.
4000 lb. Platform or Express, 4 cyl., 40 H. P. .....(Chassis) $3,250
6000 lb. Platform or Express, 4 cyl., 40 H. P. .....(Chassis) 3,850
8000 lb. Platform or Express, 4 cyl., 40 H. P.....(Chassis) 4,000
10,000 lb. Platform or Express, 4 cyl., 40 H. P.....(Chassis) 4,200

LITTLE GIANT—See Chicago Pneumatic Tool Co.

McINTYRE Co., W. H., Auburn, Ind.
600 lb. Open, 2 cyl., 14 H. P. (Air Cooled) $550
1200 lb. Open, 2 cyl., 20 H. P. (Air Cooled) 850
1500 lb. Open, 2 cyl., 20 H. P..... 1,000
2000 lb. Open, 2 cyl., 24 H. P..... 1,350
2000 lb. Open, 4 cyl., 30 H. P..... 1,500
2000 lb. Express, 4 cyl., 30 H. P..... 1,650

Complete Index to Classification appears on Pages 8 to 22.

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AGENCIES WANTED EVERYWHERE

TO SELL

Crown Commercial Cars

The latest creation of the commercial motor car world.

We manufacture a complete line of motor trucks from 1000 lb. to two ton carrying capacity and upwards.

TRANSMISSION: Individual multiple disc clutch type with differential, double chain drive.

MOTORS: Two and four cylinder.

Write for *Agency Terms* and *Territory* at once and be the first to put a **CROWN** in your town.

CROWN COMMERCIAL CAR CO.

501 BROADWAY **MILWAUKEE, WIS.**

Factory, North Milwaukee

Big Money For You. There is no reason why you cannot be our agent if you have a good standing in your community and are willing to hustle in spare time. We offer a liberal commission and a good agents' contract on our 16 different models of new cars ranging in price from $400 to $1,850. You do not need to buy a demonstrator, tie up your time nor your money. ?

Nyberg Automobile Works, 2437 Michigan Avenue, Chicago

Address Department Z.

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COMMERCIAL VEHICLES (Continued)

GASOLINE COMMERCIAL VEHICLES (Continued)

MACK BROS. Motor Car Co., Allentown, Pa.
1 Ton (Any Body), 4 cyl., 33 H. P. .....(Chassis) $2,500
1½ Ton (Any Body), 4 cyl., 33 H. P. .....(Chassis) 2,750
2 Ton (Any Body), 4 cyl., 33 H. P. .....(Chassis) 3,000
2 Ton (Any Body), 4 cyl., 60 H. P. .....(Chassis) 3,500
3 Ton (Any Body), 4 cyl., 60 H. P. .....(Chassis) 4,000
4 Ton (Any Body), 4 cyl., 60 H. P. .....(Chassis) 4,250
5 Ton (Any Body), 4 cyl., 60 H. P. .....(Chassis) 4,800
7 Ton (Any Body), 4 cyl., 60 H. P. .....(Chassis) 5,300

MARTIN Carriage Works, York, Pa.
(See page 49.)
1500 lb. Open and Closed Delivery, 2 cyl., 18 H. P.....$1,400 to 1,650

MEGOW Co., C. F., Milwaukee, Wis.
2000 to 3000 lb. Platform, 4 cyl., 24-28 H. P. $2,000
4000 to 5000 lb. Platform, 4 cyl., 35-40 H. P. 2,500
6000 lb. Platform, 4 cyl., 40-45 H. P.. 3,000
10,000 lb. Platform, 4 cyl., 50-60 H. P. 4,000

MONITOR Automobile Works, 207 N. Academy St., Janesville, Wis.
(See page 57.)
1 Ton (Any Body), 2 cyl., 24 H. P. .....$1,500 to $1,850

MORGAN Co., R. L., Worcester, Mass.
3000 lb. (Any Body), 4 cyl., 27 H. P. .....(Chassis) $2,750
4000 lb. (Any Body), 4 cyl., 27 H. P. .....(Chassis) 3,000
6000 lb. (Any Body), 4 cyl., 35 H. P. .....(Chassis) 3,500
10,000 lb. (Any Body), 4 cyl., 40 H. P. .....(Chassis) $4,750

PACKARD Motor Car Co., Detroit, Mich.
3 Ton (Any Body), 4 cyl., 24 H. P. .....(Chassis) $3,400

PACKERS Motor Truck Co., Pittsburg, Pa.
3 Ton (Any Body), 4 cyl., 50 H. P. .....(Chassis)$3,450
2 Ton (Any Body), 4 cyl., 40 H. P. .....(Chassis) 3,000
1 Ton (Any Body), 4 cyl., 30 H. P. .....(Chassis) 2,500

RANDOLPH Motor Car Co., Chicago, Ill.
1 Ton (Any Body), 2 cyl., 22 H. P., ...(Chassis) $1,850
1000 lb. (Any Body), 2 cyl., 22 H. P., ...(Chassis) 950

RAPID Motor Vehicle Co., 212 Rapid St., Pontiac, Mich.
(See page 599.)
1 Ton (Any Body), 4 cyl., 20-23 H. P. ..... (Chassis) $2,300
2 Ton (Any Body), 4 cyl., 25-30 H. P. ..... (Chassis) 2,750
3 Ton (Any Body), 4 cyl., 36-40 H. P. ..... (Chassis)..3,500

RELIANCE Motor Truck Co., Owosso, Mich.

SAMPSON Mfg. Co., Alden, Detroit, Mich.
1000 lb. (Any Body), 2 cyl., 18 H. P..$1,150
2000 lb. (Any Body), 4 cyl., 25 H. P.. ——
4000 lb. (Any Body), 4 cyl., 33 H. P.. ——
6000 lb. (Any Body), 4 cyl., 33 H. P.. ——
8000 lb. (Any Body), 4 cyl., 40 H. P.. 4,500
10000 lb. (Any Body), 4 cyl., 40 H. P.. 5,000

SCHMIDT Bros. Co., Chicago, Ill., "F. C. S."
1000 lb. (Any Body), 2 cyl., 18 H. P. (Air Cooled) .....(Chassis) $1,250
2000 lb. (Any Body), 2 cyl., 20 H. P. (Air Cooled) .....(Chassis) $1,325

SCHURMEIER Motor Car Co., St. Paul, Minn.
1500 lb. (Any Body), 2 cyl., 20 H. P. .....(Chassis)$1,870

SEITZ Automobile & Transmission Co., Detroit, Mich.

STERNBERG Mfg. Co., Milwaukee, Wis.
2000 lb (Any Body), 2 cyl., 28-30 H. P. .....(Chassis) $1,985
4000 lb (Any Body), 2 cyl., 28-30 H. P. .....(Chassis) 2,400
4000 lb. (Any Body), 4 cyl., 30-35 H. P..... 2,500
3 Ton (Any Body), 4 cyl., 40-45 H. P. .....(Chassis) 3,500
5 Ton (Any Body), 4 cyl., 55-60 H. P. .....(Chassis) 4,500

SULTAN Motor Co., Springfield, Mass.
1000 lb. Open, 4 cyl., 12-15 H. P.....$2,000

UNIVERSAL Motor Truck Co., 506 Theodore St., Detroit, Mich.
(See page 45.)
6000 lb. (Any Body), 4 cyl., 30 H. P. .....(Chassis).$3,200
3000 lb. (Any Body), 4 cyl., 20 H. P. ..... (Chassis). 2,400

VICTOR Motor Truck Co., Buffalo, N. Y.
(See page 49.)
1500 lb. (Any Body), 4 cyl., 25 H. P...$1,650
3000 lb. Express or Stake, 4 cyl., 30 H. P. 2,500
5000 lb. Express or Stake, 4 cyl., 50 H. P. 3,000
7000 lb. Express or Stake, 4 cyl., 60 H. P. 3,500
10,000 lb. Express or Stake, 4 cyl., 60 H. P. 4,500

WHITE Co., Cleveland, Ohio.
1500 lb. (Any Body), 4 cyl., 20-30 H. P. .....(Chassis) $2,100
1½ Ton (Any Body), 4 cyl., 20-30 H. P. .....(Chassis) 3,000
3 Ton (Any Body), 4 cyl., 20-30 H. P. .....(Chassis) 3,700

WILCOX Motor Car Co., Minneapolis, Minn.
2000 lb. (Any Body), 4 cyl., 30 H. P., ...(Chassis) $2,300
3000 lb. (Any Body), 4 cyl., 30 H. P., ...(Chassis) 2,500
6000 lb. (Any Body), 4 cyl., 30 H. P. .....(Chassis) 3,000

WOOD Automobile Mfg. Co., W. A., Kingston, N. Y. "Commer."

GASOLINE TAXICABS

(Unless otherwise mentioned, all cars are equipped with 4-cycle water-cooled motors.)

ALCO—See American Locomotive Co.

AMERICAN Locomotive Co., Providence, R. I. "Alco."
4 cyl., 16 H. P.....$3,350

ATLAS Motor Car Co., Springfield, Mass.
2 cyl., 20 H. P. (2 cycle).....$2,400

CROXTON Motor Co., Cleveland, O.
(See page 41.)
4 cyl., 30 H. P.....$3,300

FORD Motor Co., Detroit, Mich.
4 cyl., 20 H. P.....$1,200

FRANKLIN Mfg. Co., H. H., Syracuse, N. Y.
4 cyl., 18 H. P. (Air Cooled).....$2,850

NEW Departure Mfg. Co., Bristol, Conn. "Rockwell."
4 cyl., 20 H. P.....$——

ROCKWELL—See New Departure Mfg. Co.

SULTAN Motor Co., Springfield, Mass.
4 cyl., 12-15 H. P.....$2,500

THOMAS Motor Cab Co., Buffalo, N. Y.
4 cyl. 30 H. P.....$2,500

Complete Index to Classification appears on Pages 8 to 22.

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7000 lb. Load on 2-Ton Truck

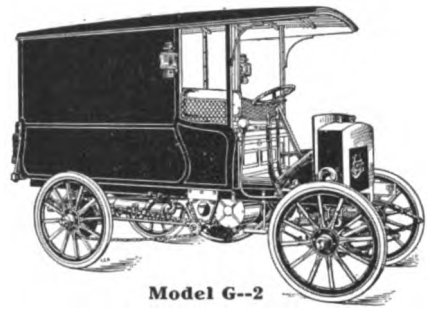
Victor Motor Trucks

are built for the hard usage of constant service. Every truck is tested for an overload of one hundred per cent. of its guaranteed capacity. Every part is extra heavy—carefully and accurately fitted—thoroughly tested. You run no chances when you sell the Victor.

Write NOW for territory

Victor Motor Truck Co.
Buffalo, N. Y.

Martin Cars



Model G--2

The Car of Quality

Write for particulars and agency proposition

25 years' experience in Delivery Wagons

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York, Pa.

Agents Wanted for

"Little Giant"

Unoccupied Territory

Manufactured by

Chicago Pneumatic Tool Company
1337 Michigan Avenue, Chicago

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COMMERCIAL VEHICLES (Continued)

ELECTRIC COMMERCIAL VEHICLES

AMERICAN Motor Truck Co., Findlay, O.
3½ Ton (Any Body).....$3,750

ATTERBURY Motor Car Co., Buffalo, N. Y.
1 Ton Panel or Express.....$2,500
2 Ton Truck..... 3,000
3 Ton Truck..... 3,500
5 Ton Truck.....4,500

BAKER Motor Vehicle Co., Cleveland, Ohio.
1000 lb. Express.....$2,200
2000 lb. (Any Body).....(Chassis) 2,300
4000 lb. (Any Body).....(Chassis) 3,100

CHAMPION Wagon Co., Owego, N. Y.

COMMERCIAL Truck Co., Philadelphia, Pa.
500 lb. Delivery.....$2,000
1000 lb. Delivery..... 2,200
2000 lb. Delivery 2,800
2 Ton Stake Body..... 3,500
3½ Ton Stake Body..... 4,500
5 Ton Stake Body..... 5,000

COUPLE-GEAR Freight-Wheel Co., Grand Rapids, Mich.
7000 lb. Stake Body.....$4,400
10,000 lb. Stake Body..... 5,000

GENERAL Vehicle Co., L. I. City, N. Y.
700 lb. (Any Body).....$1,550
1000 lb. (Any Body).....$2,200
2000 lb. (Any Body)..... 2,650
2 Ton (Any Body)..... 3,400
3½ Ton (Any Body)..... 4,000
5 Ton (Any Body)..... 4,500

LANSDEN Co., Newark, N. J.
4000 lb. Platform.....$3,600
700 lb. Closed Panel..... 2,550
2000 lb. Express.....2,750
4000 lb. Industrial Truck..... 2,000
6000 lb. Side Rack Platform Truck... 4,170

STUDEBAKER Automobile Co., Cleveland, O.
10,000 lb. Standard Stake.....$4,500

VICTOR Motor Truck Co., Buffalo, N. Y.
(See page 49.)
5000 lb. (Any Body).....$3,250
7000 lb. (Any Body)..... 3,750
10,000 lb. (Any Body)..... 4,750

STEAM COMMERCIAL VEHICLES

MICHIGAN Steam Motor Co., Detroit, Mich.

AEROPLANES

AERIAL Mfg. & Supplies Co., New York, N. Y.
Biplane, 8 cyl., 65-75 H. P.....$4,800
Biplane, 6 cyl., 40-50 H. P..... 4,200
Biplane, 4 cyl., 30-36 H. P..... 3,800

AERONAUTIC Supply Co., St. Louis, Mo. "Benoist.'
Biplane, 4 cyl, 30 H. P.....$2,250
Biplane, 8 cyl., 60 H. P..... 2,750

AMERICAN Aeroplane Supply House, Garden City, N. Y.
Monoplane, — cyl., — H. P.....$1,000

BENOIST—See Aeronautic Supply Co.

BRAUNER & Co., P., New York, N. Y.
Biplane, 3 cyl., 30 H. P.....$1,050
Biplane, 4 cyl., 30 H. P..... 1,250
Monoplane, 7 cyl., 50 H. P..... 3,800

BUMBAUGH, G. L., Indianapolis, Ind.
Biplane, 4 cyl., 40-60 H. P.....$1,500
Biplane, 4 cyl., 60-80 H. P..... 2,000
Biplane, 6 cyl., 80-100 H. P..... 2,500

BURGESS Co. & Curtis, Marblehead, Mass.
Biplane, 4 cyl., 35 H. P.....$5,000
Biplane, 8 cyl., 65 H. P..... 5,500
Biplane, 7 cyl., 50 H. P..... 7,000

CARTER & Son, 93 Nassau St., New York, N. Y.
(See page 51.)

CHICAGO Aero Works, Chicago, Ill.

CURTISS Aeroplane Co., Hammondsport, N. Y.
Biplane, 4 cyl., 25 H. P.....$5,000
Biplane, 8 cyl., 60 H. P..... 6,000

CURZON Aviation Co., East St. Louis, Ill.
Biplane, 6 cyl., 50 H. P.....$——

DETROIT Aeroplane Co., Detroit, Mich. "Miss-Detroit."
Biplane, 2 cyl., 30 H. P.....$1,500
Biplane, 6 cyl., 100 H. P..... 2,500
Monoplane, 2 cyl., 30 H. P..... 1,500
Monoplane, 6 cyl., 100 H. P..... 2,500

FRANCAISE Americaine Aeroplane Cie., Mineola, N. Y.
Monoplane, 4 cyl., 60-80 H. P.....$2,000
Monoplane, 6 cyl., 120 H. P..... 3,400

GRAY EAGLE—See Rubel, Jr., & Co.

HEMPSTEAD Aeroplane Co., Hempstead, N. Y.
Biplane 6 cyl., 38 H. P.....$——
Biplane, 6 cyl., 50 H. P..... ——
Biplane, 6 cyl., 100 H. P..... ——

IMP—See National Aviation & Construction Co.

INTERNATIONAL Airship Co., Boston, Mass. "Monarch."

KIRKHAMS-EELLS Aeroplane Co., Bath, N. Y.
Biplane, 4 cyl., 32 H. P.....$2,500
Biplane, 6 cyl., 50 H. P..... 3,500
Biplane, 8 cyl., 70 H. P..... 4,000
Biplane, 12 cyl., 100 H. P..... 7,500

LUDLOW, I.; New York, N. Y.

METZ Co., Waltham, Mass.
Monoplane, 7 cyl., 35 H. P.....$3,000
Monoplane, 7 cyl., 60 H. P..... 3,500
Monoplane, 7 cyl., 125 H. P..... 6,000

MISS DETROIT—See Detroit Aeroplane Co.

MONARCH—See International Airship Co.

NATIONAL Aviation & Construction Co., Wollaston, Mass. "Imp."

PENN Aero Construction Co., Philadelphia, Pa.

RUBEL, Jr., & Co., R. O., Louisville, Ky. "Gray Eagle."
Biplane, 4 cyl., 30-60 H. P.....$3,500

SCHUBERT Aeroplane Mfg. Co., San Jose, Cal.
Biplane, 15 cyl., 150 H. P.....$5,000
Biplane, 5 cyl., 50 H. P..... 2,000

SCIENTIFIC Aeroplane Co., New York, N. Y.
Monoplane, 3 cyl., 25-30 H. P.....$5,000
Monoplane, 2 cyl., 35-40 H. P..... 5,000
Monoplane, 7 cyl., 50 H. P..... 7,500

STUPAR, M., Chicago, Ill.

SWAMPSCOTT Launch & Dory Co., Lakeview, Wash.

WITTEMAN, C. & A., Stapleton, N. Y.

WRIGHT Co., Dayton, O.
Biplane, 4 cyl., 30-35 H. P.....$5,000

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Manufacturers, Designers and Builders of

AEROPLANES

Fac-Similes of European or American Machines, or to your own design and specification—full size to smallest miniature.

SUPPLIES AND ACCESSORIES

Expert Overhauling and Repairs. European Engines—Also Parts.

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$550 for this Bleriot Type of Monoplane in Knockdown Form.

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DIRIGIBLE BALLOONS

BUMBAUGH, G. L., Indianapolis, Ind.

FRENCH-AMERICAN Balloon Co., St. Louis, Mo.
4 cyl., 30 H. P.....$2,500
2 cyl., 5 H. P..... 1,500

STEVENS, Leo, New York, N. Y.

MOTOR BOATS

ADAMS Ship Building Co., East Boothbay, Me.
Raised Deck Cruiser, 27 ft., 2 cyl., 7 H. P..... $700

ANDERSON, Oscar, E. Norwalk, Conn.

ATLANTIC Co., Amesbury, Mass.

AUTO CRAFT—See Cleveland Auto Boat Mfg. Co.

BATH Marine Construction Co., Bath, Me.

BLUFF City Boat Co., Stillwater, Minn.

BREIN Marine Works, Rock Island, Ill.
"Firefly," "Nautilus."

BROOKS Mfg. Co., Saginaw, Mich.

BUCKSPORT Launch & Engine Works, Bucksport, Me.
Open Launch, 20 ft., 2 cyl., 6 H. P.... $300
Semi-Speed, 25 ft., 2 cyl., 10 H. P..... 400

CAMDEN Anchor-Rockland Machine Co., Camden, Me.

CAYUGA Lake Boat Yard, Kidders, N. Y.
Runabout, 20 ft., Single cyl., 3 H. P.. $300
Runabout, 26 ft., 2 cyl., 8 H. P..... 500

CAYUGA Motor Boat Co., Cayuga, N. Y.
————, 18 ft., Single cyl., 3 H. P.. $225
————, 20 ft., Single cyl., 5½ H. P. 300
————, 22 ft., 2 cyl., 8 H. P..... 450

CEDARVILLE Boat Co., Cedarville, Mich.
Runabout, 18 ft., Single cyl., 3 H. P.. $250

CENTRAL Lake Boat Mfg. Co., Central Lake, Mich.
Semi-Speed, 18 ft., Single cyl., 4 H. P. $300
Semi-Speed, 20 ft., 2 cyl., 12 H. P.... 500

CLEVELAND Auto Boat Mfg. Co., Cleveland, O. "Auto Craft."
Flat Transom, 18 ft., Single cyl., 3 H. P..... $200
Flat Transom, 21½ ft., Single cyl., 4 H. P..... 300
Flat Transom, 24 ft., 2 cyl., 8 H. P... 450

COOLEY Mfg. Co., Waterbury, Vt.

CURTIS Power Boat Co., Portland, Ore.

DEFOE Boat & Motor Works, Bay City, Mich.

DETROIT Boat Co., Detroit, Mich.

DETROIT River Boat & Oar Co., Wyandotte, Mich.
Runabout, ——, Single cyl., 3 H. P... $150
Launch, 21 ft., 2 cyl, 5 H. P..... 200
Launch, 25 ft., 2 cyl., 11 H. P..... 500

DUBUQUE Motor Boat Ways, Dubuque, Iowa.

DUNPHY Boat Mfg. Co., Eau Claire, Wis.
Semi-Speed, 18 ft., Single cyl., 3 H. P. $180
————, 23 ft., 2 cyl., 8 H. P..... 565
————, 26 ft., 2 cyl., 10 H. P..... 700

ECHO Motor Boat & Bicycle Co., Tonawanda, N. Y.

ELCO—See Electric Launch Co.

ELECTRIC Launch Co., Bayonne, N. J. "Elco."
Runabout, 28 ft., 4 cyl., 40 H. P.....$2,000
Express, 35 ft., 6 cyl., 60 H. P.....$4,000
Cruiser, 40 ft., 4 cyl., 20 H. P..... 4,500

FAY & Bowen Engine Co., Geneva, N. Y.

FELLOWS Yacht & Launch Co., Joe, Wilmington, Cal.
Runabout, 18 ft., Single cyl., 3 H. P.. $325

FIREFLY—See Brein Marine Works.

GAS Engine & Power Co. and Chas. L. Seabury & Co., New York, N. Y.

GILE Boat & Engine Co., Ludington, Mich.
Semi-Speed, 16 ft., Single cyl., 3 H. P. $145
Semi-Speed, 18 ft., Single cyl., 3 H. P. 165
Semi-Speed, 20 ft., Single cyl., 5 H. P. 250

GORHAM Engineering Co., Alameda, Cal.

GREENPORT Basin & Construction Co., Greenport, N. Y.
Speed, 20 ft., 2 cyl., 11 H. P..... $450
Speed, 20 ft., 2 cyl., 15 H. P..... 550
Speed, 20 ft., 3 cyl., 25 H. P..... 650

HANKSCRAFT Co., Chicago, Ill.
————, 24 ft., 4 cyl., 17 H. P.....$1,300
————, 30 ft., 4 cyl., 25 H. P..... 2,500
————, 40 ft., 6 cyl., 60 H. P..... 2,200

HEIM Boat Co., Milwaukee, Wis.

HOLMES Motor Co., New York, N. Y.
Runabout, 30 ft., 4 cyl., 25 H. P.....$2,000
Runabout, 35 ft., 6 cyl., 40 H. P..... 2,600
Cruiser, 30 ft., 6 cyl., 90 H. P..... 3,000

HUDSON Yacht & Boat Co., Nyack, N. Y.
Raised Deck Cruiser, 35 ft., 2 cyl., 15 H. P.....$1,500
Raised Deck Cruiser, 30 ft., 2 cyl., 15 H. P..... 1,350
Semi-Speed, 22 ft., 3 cyl., 11 H. P.... 800

HUNTER Boat Co., Everett, McHenry, Ill.

IOWA Marine Engine & Launch Works, Bellevue, Iowa.
Runabout, 20 ft., Single cyl., 3 H. P.. $240
Runabout, 20 ft., 2 cyl., 6 H. P..... 350
Open Launch, 26 ft., 3 cyl., 15 H. P.. 750

JACOBSEN & Co., C. M., Detroit, Mich.
Canoe, 18 ft., Single cyl., 2 H. P..... $175
Canoe, 18 ft., 2 cyl., 4 H. P..... 200

JESIEK Boat Co., Grand Rapids, Mich.

JONES & La Borde Co., Oshkosh, Wis.

KENNEBEC Boat & Canoe Co., Waterville, Me.

KERSHAW-WILLIAMS Co., Boston, Mass.
Dory, 20 ft., Single cyl., 3 H. P..... $375
Runabout, 22 ft., Single cyl., 3 H. P.. 750

KIDNEY & Son, Dan, West DePere, Wis.

LAMB Boat Works, Harbor Springs, Mich.
Runabout, 26 ft., 2 cyl., 20 H. P..... $900

LEWIS Boat Works, Oshkosh, Wis.
Transom Stern, 19 ft., Single cyl., 4 H. P..... $225
Transom Stern, 22 ft., Single cyl., 4 H. P..... 256
Transom Stern, 22 ft., 2 cyl., 7 H. P.. 365

LEXINGTON Motor Boat Co., Lexington, Ky.
Transom Stern, 18 ft., 2 cyl., 4 H. P.. $200
Transom Stern, 23 ft., 2 cyl., 8 H. P.. 425
Transom Stern, 25 ft., 2 cyl., 12 H. P. 525
Compromise Stern, 20 ft., Single cyl., 6 H. P..... 350
Fan Tail Stern, 25 ft., Single cyl., 8 H. P..... 550

LINDLEY Co., W. H., Canastota, N. Y.

LUDERS Marine Construction Co., Port Chester, N. Y.

MARTIN, C. N., Port Chester, N. Y.

MATHISEN Boat Co., Oshkosh, Wis.
Runabout, 22 ft., 2 cyl., 8 H. P..... $370
Runabout, 22 ft., 2 cyl., 10 H. P..... 465
Semi-Speed, 26 ft., 2 cyl., 18 H. P.... 625
Speed, 26 ft., 4 cyl., 36 H. P..... 1,000

MATTHEWS Boat Co., Port Clinton, Ohio.

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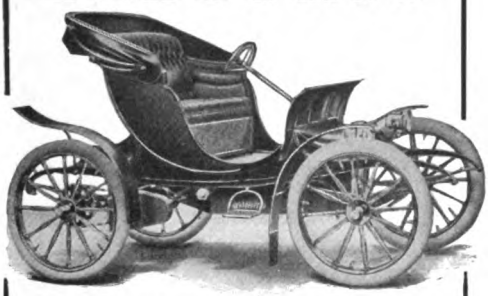
Unapproachable Quality
of the

BAILEY ELECTRIC



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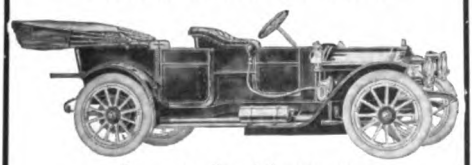

Compare It with any car at anywhere Its Price

Three Point Suspension Unit Type Power Plant

Cylinders, 4¼x4½, 30-36 H.P.

Wheelbase, 118 Inches

Tires, 34x4 with Demountable Rims

Cole Flyer, Torpedo Roadster, 36 H.P...$1,600
Made New World's Record for Cars of Its Class.

Palace Touring Car, 36 H.P.....$1,600
A Car of Superb and Silent Service.

"Fore-Dore" Toy Tonneau, 36 H.P....$1,650
A Car You'll Be Proud to Own.

"Fore-Dore" Touring Car, 36 H.P.....$1,650
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Longest Wheel Base, Largest Body, Easiest Riding Electric; Westinghouse Motor, Exide Batteries (40 cells), Motz Tires. This car is the only Electric Brougham on the market that will seat 4 large people with ease and comfort. The Ideal is also the only moderate-priced Brougham manufactured. *Send for Catalog and Photograph.*

PRICE, $2,000.00.

IDEAL ELECTRIC VEHICLE CO.,
308 E. Huron St., Chicago, Ill.

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MOTOR BOATS (Continued)

MICHIGAN Steel Boat Co., Detroit, Mich.

MILLER & Co., Geo. H., Patchogue, N. Y.
Cabin Launch, 30 ft., 2 cyl., 12 H. P..$1,000
Cabin Launch, 36 ft., 2 cyl., 15 H. P.. 2,400
Cabin Launch, 40 ft., 2 cyl., 20 H. P.. 3,000

MILTON Boat Works, Rye, N. Y.
Raised Deck Cruiser, 25 ft., —— cyl., —— H. P.....$ ——
Semi-Speed, 20 ft., —— cyl., — H. P. ——

MULLINS Co., W. H., Salem, O.

MURRAY & Tregurtha Co., Boston, Mass.

NAUTILUS—See Brein Marine Works.

NEW YORK Yacht, Launch & Engine Co., New York, N. Y.

NIAGARA Motor Boat Co., North Tonawanda, N. Y.

OSBORN, Wm. R., Croton, N. Y.
Runabout, 22 ft., Single cyl., 3 H. P.. $350
Runabout, 22 ft., —— cyl., 5 H. P.... 450
Raised Deck Cruiser, 25 ft., 2 cyl., 8 H. P..... 800

OUTING Boat Co., Ashland, Wis.

PACKARD Motor Yacht Co., Norwood, O.

PALMER Bros., Cos Cob, Conn.

PATTERSON, A. C., Point Pleasant, Ky.
Semi-Speed, 18 ft., Single cyl., 3 H. P..... $160
Speed, 26 ft., 3 cyl., 25 H. P..... 1,200
Speed, 32 ft., 6 cyl., 100 H. P..... 2,500

PETOSKEY Boat Co., Petoskey, Mich.

PORTAGE Boat & Engine Co., Portage, Wis.

POWELL Cove Boat Co., College Point, N. Y.
Open, 15 ft., Single cyl., 1½ H. P..... $175
Open, 18 ft., Single cyl., 3 H. P..... 275
Open, 21 ft., 2 cyl., 6 H. P..... 365

RACINE Boat Co., Racine, Wis.

RED Wing Motor Co., Red Wing, Minn.
Runabout, 16 ft., Single cyl., 3 H. P.$157.50
Runabout, 18 ft., Single cyl., 4 H. P. 195.00
Runabout, 20 ft., Single cyl., 4 H. P. 225.00

RELIANCE Motor Boat Co., New York, N. Y.

RICE Bros. Co., E. Boothbay, Me.
Runabout, 20 ft., Single cyl., 4 H. P.. $275

RIPLEY Boat Co., Augusta, Me.
Launch, 20 ft., Single cyl., 3 H. P.... $250
Semi-Speed, 24 ft., 2 cyl., 8 H. P..... 500
Cruiser, 25 ft., 2 cyl., 10 H. P..... 600

RIPPLEY Steel Boat Co., Grafton, Ill.

RUDDOCK Boat & Yacht Works, New York, N. Y.

ST. PAUL Boat Co., St. Paul, Minn.
————, 18 ft., Single cyl., 3 H. P.. $200
————, 22 ft., Single cyl., 6 H. P.. 350
————, 25 ft., 4 cyl., 12 H. P..... 500

SAVANNA Boat Works, Savanna, Ill.
Runabout, 26 ft., 4 cyl., 36 H. P..... $650
————, 22 ft., 2 cyl., 8 H. P..... 350

SEAMAN Motor & Launch Works, Long Branch, N. J.
Speed, 22 ft., 3 cyl., 25 H. P..... $934
Speed, 25 ft., 3 cyl., 25 H. P..... 1,034
Speed, 30 ft., 3 cyl., 25 H. P..... 1,184

SKANEATELES Boat & Canoe Co., Skaneateles, N. Y.

SPARKS Boat & Engine Co., Alton, Ill.

SUSQUEHANNA Marine Works Co., Havre de Grace, Md.
Open Launch, 20 ft., Single cyl., 4 H. P..... $285
Open Launch, 25 ft., 2 cyl., 10 H. P... 750

SWAMPSCOTT Launch & Dory Co., Lakeview, Wash.

TARRYTOWN Boat Works, Tarrytown, N.Y.

THOMPSON Boat & Pattern Works, H. F., Decorah, Iowa.
Speed, 25 ft., 3 cyl., 24 H. P..... $750
Runabout, 25 ft., 2 cyl., 20 H. P..... 625
Runabout, 16 ft., Single cyl., — H. P. 175

THOUSAND Island Boat & Engine Co., Morristown, N. Y.
Runabout, 28 ft., 3 cyl., 15 H. P.....$1,450
Runabout, 32 ft., 6 cyl., 30 H. P..... 2,200

TOPPAN Boat Mfg. Co., Boston, Mass.
Dory, 18 ft., Single cyl., 1 H. P..... $195
Open Launch, 18 ft., Single cyl., 1 H. P..... 345

TREGONING Boat Co., Seattle, Wash.

TROMBLEY & Coash Boat Works, Saginaw, Mich.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich.

VALLEY Boat & Engine Co., Saginaw, Mich.

WECKLER Boat Co., Chicago, Ill.
————, 21 ft., 2 cyl., — H. P..... $475
————, 23 ft., 4 cyl., — H. P..... 550
————, 25 ft., 4 cyl., — H. P..... 630

WEST Mystic Boat Co., West Mystic, Conn.
Cabin Cruiser, 25 ft., Single cyl., 7 H. P.....$1,000
Cabin Cruiser, 20 ft., Single cyl., 5 H. P..... 650
Open Launch, 20 ft., Single cyl., 4 H. P..... $475
Bridge Deck Cruiser, 35 ft., 4 cyl., 18-25 H. P..... 3,500
Day Cruiser, 36 ft., 4 cyl., 25-40 H. P. 4,500

WHITE & Co., E. M., Oldtown, Me.
Canoe, 20 ft., Single cyl., 3 H. P..... $255
Transom Stern, 20 ft., 2 cyl., 8 H. P.. 350
Transom Stern, 25 ft., 4 cyl., 20 H. P. 500

MOTOR CYCLES

AMERICAN Motor Co., Brockton, Mass. "M. M."
Single cyl., 4 H. P..... $225
Double cyl., 7 H. P..... 300

AMERICAN Motor Cycle Co., Chicago, Ill.
1 cyl., 4½ H. P..... $235

ARMAC Motor Co., Chicago, Ill.
Single cyl., 4½ H. P..... $225
Double cyl., 7 H. P..... 275

AURORA Automatic Machinery Co., Chicago, Ill "Thor."
Single cyl., 4 H. P..... $225
Double cyl., 7 H. P..... 325

C. V. S.—See Stahl Motor Works.

CHICAGO Motorcycle Works, Chicago, Ill. "Meteor."
Single cyl., 4 H. P..... $250

CONSOLIATED Mfg. Co., Toledo, O. **(See page 319.)**
Single cyl., 4 H. P..... $200
Double cyl., 7 H. P..... 300

CROWN—See Great Western Mfg. Co.

DETROIT Motorcycle Co., Detroit, Mich.
Single cyl., 4 H. P..... $225

EMBLEM Mfg. Co., Angola, N. Y.
Single cyl., 4 H. P..... $200
Single cyl., 5 H. P..... 225
Double cyl., 7 H. P..... 250

EXCELSIOR Motor & Mfg. Co., Chicago, Ill.
Single cyl., 4 H. P..... $225
Double cyl., 6 H. P..... 310

FLYING MERKEL—See Merkel-Light Motor Co.

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Garford

We have just completed our first limousine. We wish you could see it and examine it inside and out. It is different from the average limousine and what may be properly termed "made to order." We will not make many limousines. Each one is a "job" in itself—an edition de luxe as it were. The body is the work of Atwood, the celebrated New Haven coach maker, who is regarded as the leader in the art in the world. The result is beautiful.

Garford touring cars—the G-8's—are selling faster than we can make them. These, too, will be limited in number for 1911.

SEND FOR PRELIMINARY G-8 CIRCULAR EXPLAINING WHY GARFORD CARS MUST BE THE BEST

The Garford Company
ELYRIA, O., U. S. A.
(Licensed under Selden Patent)

Overland

The Car That Everybody Wants

More than a thousand automobile dealers are selling Overlands to-day; but a year ago there were barely fifty.

The question is—"Why?" The answer is—"Demand." Demand from a thousand cities and towns, from ten thousand villages and hamlets—a demand that has swelled like a flood and astonished the industry.

There must be something superlatively desirable in an automobile which could so forge to the front in a single year, win the confidence of buyers, and prove the most successful of all lines for a dealer.

Why not investigate and supply the demand that exists right in your own territory?

22 Models:—20 to 40 h. p.—$795 to $1675

THE WILLYS-OVERLAND CO.
TOLEDO, OHIO

Velie Automobiles

It is common gossip that the 1911 Velie Automobile is the Best Buy in America.

It's apparent at a glance. Better look.

Price $1800.00 to $2000.00

Velie Motor Car Company
CHICAGO, ILL.

TRADE KLINE KAR MARK

THE moderate price and the perfection of its construction give to the KLINE KAR an advantage not to be overlooked by those who contemplate selling motor cars. Everything favors the success of the KLINE KAR. Made by the most expert men, under the most expert management, in a new and splendidly equipped factory, from only the newest and best materials. Many years of successful experience in building motor cars also enters into the KLINE KAR.

B. C. K. MOTOR CAR CO.
YORK, PA.

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MOTOR CYCLES
(Continued)

GREAT Western Mfg. Co., LaPorte, Ind. "Crown."
Single cyl., 4 H. P..... $200

GREYHOUND Motor Co., Buffalo, N. Y.
Single cyl., 4½ H. P..... $225

HARLEY-DAVIDSON Motor Co., Milwaukee, Wis.
Single cyl., 4 H. P..... $225
Double cyl., 6½ H. P..... 300

HENDEE Mfg. Co., Springfield, Mass. "Indian."
Single cyl., 2¾ H. P..... $200
Single cyl., 4 H. P..... 250
Double cyl., 5 H. P..... 275
Double cyl., 7 H. P..... 300

INDIAN—See Hendee Mfg. Co.

KOKOMO Motor Cycle Co., Kokomo, Ind.
Single cyl., 3½ H. P..... $200

M. M.—See American Motor Co.

MARATHON—See Rhodes, L. E.

MARVEL Motorcycle Co., Hammondsport, N. Y.
Single cyl., 5 H. P..... $225

MERKEL-LIGHT Motor Co., Pottstown, Pa. "Flying Merkel."
Single cyl., 4 H. P..... $250
Double cyl., 6 H. P..... 300
Double cyl., 7 H. P..... 325

METEOR—See Chicago Motorcycle Works.

MIAMI Cycle & Mfg. Co., Middletown, Ohio. "Racycle."
Single cyl., 4 H. P..... $225

MINNEAPOLIS Motor Cycle Co., Minneapolis, Minn.
Single cyl., 4 H. P..... $235
Single cyl., 5 H. P..... 300

NEW Era Auto Cycle Co., Dayton, O.
Single cyl., 4 H. P..... $275
Single cyl., 6 H. P..... 325

PEERLESS S. D.—See S. D. Mfg. Co.

PIERCE Cycle Co., Buffalo, N. Y.
Single cyl., 5 H. P..... $250
4 cyl., 7 H. P..... 400

POPE Mfg. Co., Hartford, Conn.

RACYCLE—See Miami Cycle & Mfg. Co.

READING Standard Co., Reading, Pa.
Single cyl., 4 H. P..... $250

RELIANCE Motorcycle Co., Owego, N. Y.
Single cyl., 4½ H. P..... $240

RHODES, L. E., Hartford, Conn., "Marathon."
Double cyl., 7 H. P. (2 cycle)..... $350

S. D. Mfg. Co., Brooklyn, N. Y. "Peerless S. D."
Single cyl., 4 H. P..... $250

STAHL Motor Works, C. V., Philadelphia, Pa.
Single cyl., 4 H. P..... $210
Double cyl., 7 H. P..... 300

THEIM Mfg. Co., St. Paul, Minn.
Single cyl., 4½ H. P..... $225

THOR—See Aurora Automatic Machinery Co.

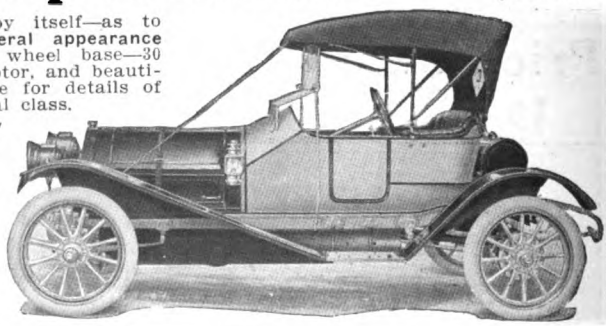
WAGNER Motorcycle Co., St. Paul, Minn.
Single cyl., 4 H. P..... $210

Cutting CARS give the purchaser the maximum of style, power and satisfaction for the money invested. Engineering skill of the highest order, ample capital, modern factory facilities and a willingness to sell on a modest margin of profit, make Cutting Cars at Cutting prices possible.

The Cutting Torpedo Roadster Price $1200

is distinctly in a class by itself—as to quality, workmanship, general appearance and price. Has 116-inch wheel base—30 horse-power, long stroke motor, and beautiful lines and finish. Write for details of our full line of cars of equal class.

Some dealers' territory still open.



Clarke-Carter Automobile Company
JACKSON, MICH.

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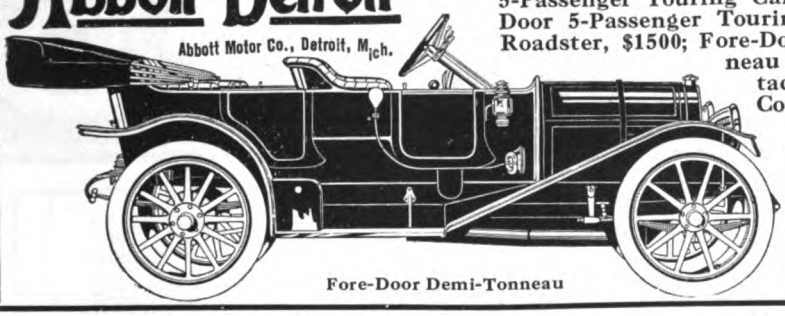
Abbott-Detroit

Abbott Motor Co., Detroit, Mich.



Fore-Door Demi-Tonneau

PRICES

5-Passenger Touring Car, $1500; Fore-Door 5-Passenger Touring Car, $1550; Roadster, $1500; Fore-Door Demi-Tonneau (Tonneau detachable), $1650; Coupe, $2350, all include standard equipment, f. o. b. Detroit, Mich.

Write for our book on Abbott Detroits.

THE ROADER CAR at $650

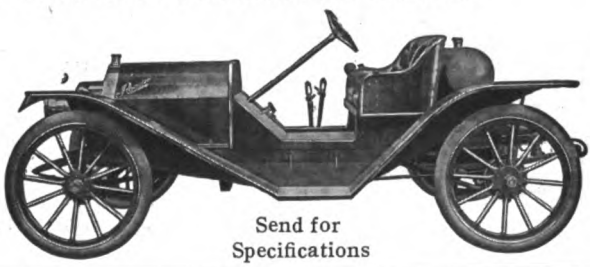
IS THE CAR THAT FITS THE PRESENT MARKET

Powerful and Speedy
Graceful and Racy in design

20 Horse Power
Water Cooled
Motor Cast Enbloc

Sliding Gear Transmission
Shaft drive

ROADER CAR CO.
BROCKTON, MASS.



Send for Specifications

Moon "45"—Six years of proud reputation. A high-grade car built to withstand strenuous service.

Touring Car, $3000 Fore-door, $3100
Limousine, $4000.

Moon "30"—T-head Motor, long stroke. Touring Car, $1500; Fore-door, $1600.

MOON MOTOR CAR COMPANY
Jos. W. Moon, Pres.
Main and Cornelia Streets, : St. Louis

Dealers: The business is there

Get it!

Get it and keep it by taking the agency for the

MONITOR

The 2000-lb. car shown will do the work of three horse-drawn vehicles at half the cost. Write for prices and agency offer before your territory is taken.

Monitor Automobile Works
207 N. Academy St.
Janesville, Wis.

Designed Right
Built Right—Priced Right

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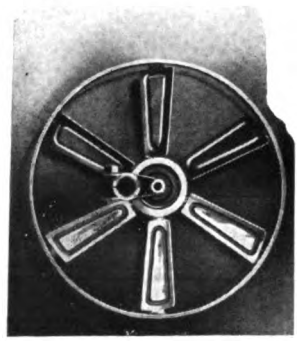
Ball-Bearing
MOTOR FANS
Highly Efficient and Durable.
As in our other specialties the best of facilities for prompt deliveries.



SOME PRODUCTS OF ONE OF THE NEWEST AND

The Popular McCord Radiator

KNOWN everywhere that motor cars go for strength, beauty and efficiency.

Experience, organization and capital has placed the McCord Radiator in an enviable position.

DETROIT

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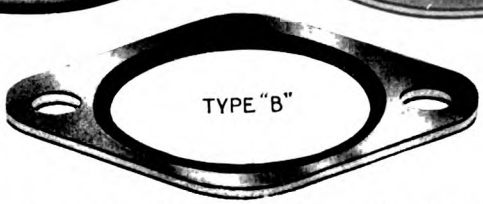
MANUFACTURING COMPANY

McKim Copper Asbestos Gaskets



The Standard Gasket on all Gasoline Motor Flanges and Joints in America. Most economical gasket for this service. Nearly everybody is using them. ARE YOU?

MOST COMPLETE PARTS FACTORIES in the COUNTRY

McCORD Force Feed Lubricator.

THE McCORD Lubricator on thousands of Automobiles, Motor Boats, Locomotives, Stationary Engines, Pumps, Compressors and Traction Engines of all classes, for the past ten years

Has always delivered the goods and will continue to do so.

MICHIGAN

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PARTS AND ACCESSORIES

ACID

BATTERY ACID

(See Electrolyte, Battery)

SOLDERING ACID

(See Flux, Soldering)

ADAPTERS

ELECTRIC LAMP ADAPTERS

(For converting gas or oil lamps into electric lamps)

ARSENO Electric Co., 819A Boylston St., Boston, Mass.

BECKLEY-RALSTON Co., Michigan Ave. and Randolph St., Chicago, Ill. "Fits-All."
(See page 159.)

C-S—See Culver-Stearns Mfg. Co.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy."
(See page 61.)

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass. "C-S."

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O. "Fits-All."

DIETZ Co., R. E., 60 Laight St., New York, N. Y.
(See page 253.)

FITS-ALL—See Dayton Electrical Mfg. Co.

FITZ-ALL—See Beckley-Ralston Co.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill.
(See page 255.)

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Lightning."
(See page 283.)

GENERAL Electric Co., Schenectady, N. Y.

GIL-BO—See Metal Specialties Mfg. Co.

GRAY & Davis, Amesbury, Mass.
(See page 255.)

GUIDE Motor Lamp Mfg. Co., Cleveland, O.
(See page 61.)

H. & H.—See Hammer & Hull.

HAMMER & Hull, 1839 Euclid Ave., Cleveland, O. "H. & H."

HANDY—See Chicago Electric Mfg. Co.

HOLD TIGHT—See Newlin, W. S.

HOWARD Miniature Lamp Co., 327 Academy St., Newark, N. J.

LIGHTNING—See Garage Equipment Mfg. Co.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

METAL Specialties Mfg. Co., 427-41 Randolph St., Chicago, Ill. "Gil-Bo."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

NEWLIN, W. D., 219 E. Pine St., Paxton, Ill. "Hold Tight."

S-H.—See Stuart-Howland Co.

STUART-HOWLAND Co., 1-3 Winthrop Sq., Boston, Mass. "S-H."

ADJUSTERS

MOTOR CYCLE CHAIN ADJUSTERS

CLARK & Son, A. N., Plainville, Conn.

ALARMS

BOILER ALARMS

(See Columns, Water)

TIRE ALARMS

(For indicating when tires are under or over inflated

TERPENING, E. A., Mokena, Ill.

ALCOHOL

DENATURED ALCOHOL

GRAY & Co., Wm. S., 76 William St., New York, N. Y.

UNITED States Industrial Alcohol Co., 100 William St., New York, N. Y.

WEBB & Son, James A., 50-52 Stone St., New York, N. Y.

WOOLNER Distilling Co., foot of Spillman St., Peoria, Ill.

ALUMINUM

SHEET AND ROD ALUMINUM

(For Aluminum Castings—See Castings, Aluminum)

ALUMINUM Co. of America, Pittsburg, Pa.

Complete Index to Classification appears on Pages 8 to 22.

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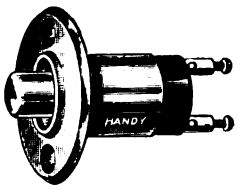
"HANDY" (TRADE MARK) SWITCHES AND CONNECTORS



"HANDY" Floor Switch

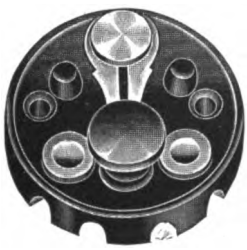
No. 3600—Ediswan Connector

No. 36

No. 10000—Ediswan Receptacle and Plug

"HANDY" Flush Push Switch

More in Our Catalog



No. 112—Battery Switch

Chicago Electric Mfg. Co.

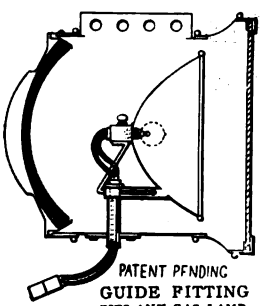
531 Van Buren Street

CHICAGO, ILL.

GUIDE

ELECTRIC LAMPS

AND FITTINGS



Model 95

Represent the highest standard of

Efficiency, Style and Quality

No. 1 OIL FITTING

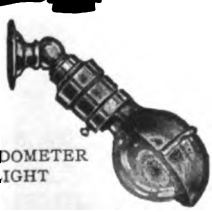
Model 99

We make complete line for GASOLINE AND ELECTRIC CARS

Also

MOTOR BOATS

Catalogue on request



Model 911 SPEEDOMETER LIGHT

GUIDE MOTOR LAMP MFG. CO., Cleveland, Ohio, U.S.A.

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AMMETERS

STANDARD AMMETERS AND VOLTMETERS

(For Switchboard and Electric Vehicle use. For Pocket Meters—See Gauges, Battery)

CLARK Electric Meter Co., 126-28 S. Clinton St., Chicago, Ill.

DONGAN Electric Mfg. Co., 15-17 E. Woodbridge St., Albany, N. Y.

ELDREDGE Electric Mfg. Co., 7 Post Office Square, Springfield, Mass.

FORT Wayne Electric Works, Fort Wayne, Ind. "Wood."

GENERAL Electric Co., Schenectady, N. Y.

INTERNATIONAL Electric Meter Co., 342-44 N. Sheldon St., Chicago, Ill.

KEYSTONE Electrical Instrument Co., 9th St. & Montgomery Ave., Philadelphia, Pa.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

NORTON Electrical Instrument Co., Manchester, Conn.

PIGNOLET, Louis M., 73 Cortlandt St., New York, N. Y.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

RELIANCE Instrument Co., 1135 Van Buren St., Chicago, Ill.

ROLLER-SMITH Co., Bethlehem, Pa.

TROY Electrical Co., River & State Sts., Troy, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WESTON Electrical Instrument Co., Waverly Park, Newark, N. J.

WOOD—See Fort Wayne Electric Works.

ANCHORS

FLOATING OR SEA ANCHORS

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

FOLDING, STOCKLESS AND STANDARD ANCHORS

BALDT Anchor Co., Chester, Pa.

BALDT Steel Co., New Castle, Del.

BLEECKER Sons, A., 44 South St., New York, N. Y.

LAUGHLIN Co., Thos., 143 Ford St., Portland, Me.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 349.)

MARINE Hardware & Equipment Co. (S. Portland), Portland, Me.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

NEPTUNE Hardware Mfg. Co., 54 South St., New York, N. Y.

PERKINS & Co., Henry, Bridgewater, Mass.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

MOORING ANCHORS

COOLEY Mfg. Co., Waterbury, Vt.

FAIRHAVEN Iron Foundry Co., 1 Water St., Fairhaven, Mass.

ANEMOMETERS

ANEMOMETERS AND WIND GAUGES

WARNER Instrument Co., Beloit, Wis.
(See page 667.)

ANNUNCIATORS

AUTOMOBILE ANNUNCIATORS

(For Signaling from passenger to driver. For Speaking Tubes—See Tubes, Speaking)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

HOLT & Beebee, 40 Sudbury St., Boston, Mass.
(See page 257.)

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

ASBESTOS

SHEET ASBESTOS

(For Asbestos Packing—See Packing, Asbestos)

ALLIANCE Asbestos Co., Alliance, O.

AMERICAN Asbestos Co., Stanbridge & Sterigere Sts., Norristown, Pa.

ASBESTOS Mfg. Co., 117 Front St., Philadelphia, Pa.

CAREY Co., Philip (Lockland), Cincinnati, O.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J-M."

KEASBEY & Mattison Co., Ambler, Pa.

NEW Jersey Asbestos Co., 11th & Linden Sts., Camden, N. J.

NEW York Asbestos Mfg. Co., 80 John St., New York, N. Y.

SALL Mountain Asbestos Mfg. Co., 230 S. LaSalle St., Chicago, Ill.

WATSON Co., H. F., Erie, Pa.

AWNINGS

MOTOR BOAT AWNINGS AND CANOPIES

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

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MOTORS = AXLES

Plain and Unit Power Plant — Front and Rear

TRANSMISSIONS

The fact that we make these parts is not as impressive as is our Equipment and Capacity to make many of them and above all to make them Right in Quality—Price—Delivery

(Long Stroke) MOTORS

Plain:

25-30 HP. 3¾"x5"
35-40 HP. 4½"x7"

Unit Power Plant:

25-30 HP. 3¾"x5"
35-40 HP. 4½"x7"

Cylinders cast en bloc

OUR HOME

AXLES

FRONT
- *Light Car Type*
- *Touring Car Type*
- *I beam complete with hubs*

REAR
- *Light Car Type*
- *Touring Car Type semi-floating*
- *Touring Car Type semi-floating*
- *Transmission in axle*

WE have the facilities to furnish these stock parts to manufacturers desiring Quality.
WE have the Capacity to make Motors and Axles from your specifications.
By not getting acquainted we are both losing an opportunity.

Let us quote you.

SANDUSKY AUTO PARTS & MOTOR TRUCK CO.

SANDUSKY OHIO

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AWNINGS (Continued)

MOTOR BOAT AWNINGS AND CANOPIES (Continued)

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

CARPENTER & Co., Geo. B., 206 S. Water St., Chicago, Ill.

CHICAGO Flag & Decorating Co., 1349 Wabash Ave., Chicago, Ill.

GOSS Co., J. C., 10 Atwater St., E., Detroit, Mich.

HEMMENWAY & Son, 54-58 South St., New York, N. Y.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

KENYON Co., R. L., Waukesha, Wis.

LINDLEY Co., W. H., Main & Canal Sts., Canastota, N. Y.

PEASE Co., L. F., Providence, R. I.

RATSEY & Lapthorn, City Island, N. Y.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMAS & Co., Wm. E., 42 South St., New York, N. Y.

THOMPKINS & Co., John W., 46-48 14th St., Hoboken, N. J.

VANDERHERCHENS Sons, 7 N. Water St., Philadelphia, Pa.

AXLES

AEROPLANE AXLES

WEAVER, Jr., J. A., 956 Eighth Ave., New York, N. Y.

FRONT AXLES

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, O.
(See page 71.)

AMERICAN Gear & Mfg. Co., Jackson, Mich.
(See page 575.)

AUTO Parts Mfg. Co., Detroit, Mich.
(See page 773.)

B & L—See Sheldon Axle Co.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

CLEVELAND Axle Mfg. Co., Canton, O.

DIEBOLD-PETERS Co., Whitney Power Bldg., Cleveland, O.

DRAGON—See Sheldon Axle Co.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

DUNLAP Engineering Co., Columbus, O.
(See page 595.)

ELYRIA Machine Parts Co., Elyria, O.

EMPIRE—See Sheldon Axle Co.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 601.)

GREENVILLE Metal Products Co., Greenville, Pa.

HESS Spring & Axle Co., Carthage, O.

HIGGINS Spring & Axle Co., Racine, Wis.
(See page 393.)

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 225.)

KRUPP—See Prosser & Son.

LEE & Porter Mfg. Co., Buchanan, Mich.

LEWIS Spring & Axle Co., Jackson, Mich.
(See page 574.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LONG Arm System Co., Cleveland, O.

McCUE Co., Hartford, Conn.
(See pages 71 and 291.)

METAL Products Co., Waterloo St. and Detroit Terminal R. R., Detroit, Mich.
(See page 745.)

MOTT Wheel Works, Utica, N. Y.
(See page 699.)

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

PATHFINDER—See Weaver Co.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers). "Krupp."
(See page 403.)

PROVIDENCE Engineering Works, Providence, R. I.
(See page 367.)

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page 489.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

SANDUSKY Auto Parts & Motor Truck Co., Sandusky, O.
(See page 63.)

SCRANTON Axle Works, Scranton, Pa.

SHELDON Axle Co., Wilkes-Barre, Pa. "B & L," "Dragon," "Empire," "Ton-Don."
(See pages 66 and 67.)

SMITH Co., A. O., Milwaukee, Wis.
(See page 397.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.
(See page 713.)

SUPERIOR Axle & Forge Co., Buffalo, N. Y.
(See pages 69 and 70.)

TIMKEN Detroit Axle Co., 132 Clark St., Detroit, Mich.

TIPPETT Mfg Co., 172-82 W. Locust St., Columbus, O.
(See page 579.)

TON-DON—See Sheldon Axle Co.

WEAVER Co., Geo. A., Newport, R. I. "Pathfinder."

WESTON-MOTT Co., Flint Mich.
(See page 65.)

REAR AXLES

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, O.
(See page 71.)

AMERICAN Gear & Mfg. Co., Jackson, Mich.
(See page 575.)

AUTO Parts Mfg. Co., Detroit, Mich.
(See page 773.)

Complete Index to Classification appears on Pages 8 to 22.

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W.M.CO.

RELIABILITY

AXLES

Fronts
- Pleasure Car
  - I Beam
  - Tubular
- Truck
  - I Beam
  - Square or Rect. Section

Rears
- Pleasure Car
  - Bevel Drive
  - Single Chain Drive
  - Double " "
- Truck
  - Bevel Drive
  - Single Chain Drive
  - Double " "

Countershafts
- Bevel Drive
- Chain "

Rims
- Standard
  - Universal QD
  - Clincher

Send us your specifications or write for full details

WESTON-MOTT COMPANY

FLINT, MICHIGAN

ESTABLISHED 1884

WM CO

WM CO

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SHEL

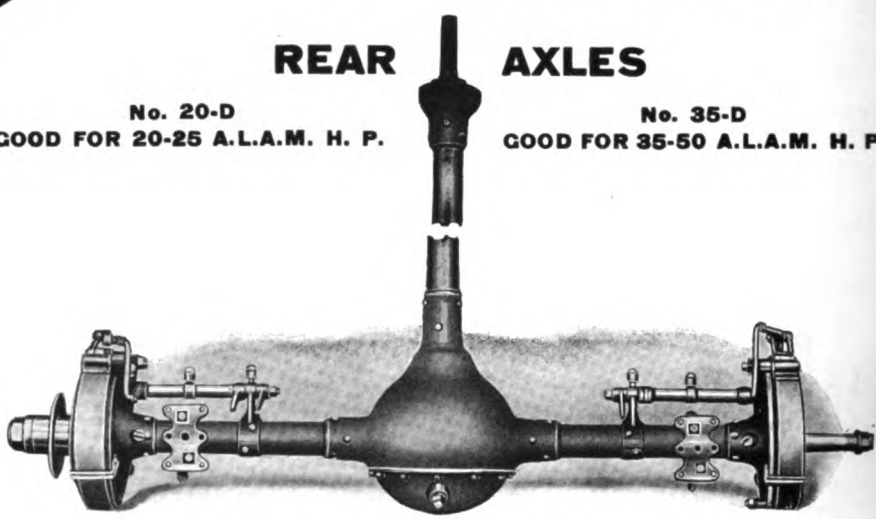
AUT

AXLES AND SPRINGS
HIGHER IN PRICE BUT

REAR AXLES

No. 20-D
GOOD FOR 20-25 A.L.A.M. H. P.

No. 35-D
GOOD FOR 35-50 A.L.A.M. H. P.



JACKSHAFTS
WITH OR WITHOUT TRANSMISSION OR BRAKES

I-BEAM
SOLID FRONT AXLE

SHELDON AXLE COMPANY
WILKES-BARRE, PA.
LARGEST AXLE AND SPRING FACTORY IN THE WORLD

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DON

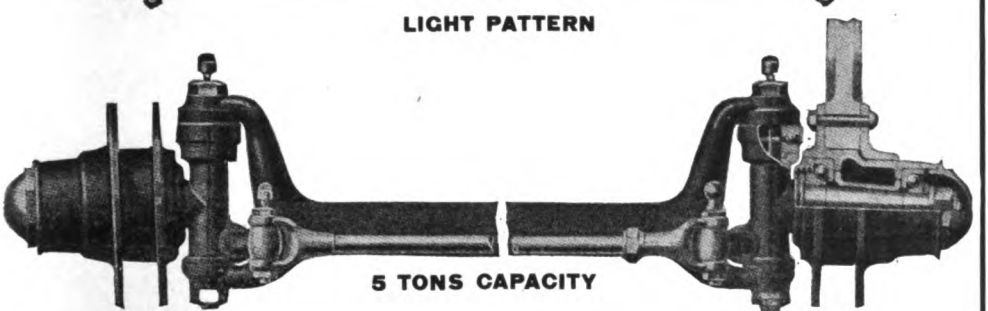
MOBILE

AXLES AND SPRINGS
HIGHER IN QUALITY

SPRINGS
THE FAMOUS SHELDON
EASIEST RIDING SPRING
EVER MADE

COMMERCIAL TRUCK AXLES
FROM
500 POUNDS TO 20,000 POUNDS CAPACITY

LIGHT PATTERN



5 TONS CAPACITY

SHELDON AXLE COMPANY
WILKES-BARRE, PA.
LARGEST AXLE AND SPRING FACTORY IN THE WORLD

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AXLES (Continued)

REAR AXLES (Continued)

COLLINS Gear & Motor Co., 319 Frick Bldg., Pittsburg, Pa.

COVERT Motor Vehicle Co., Lockport, N. Y.

DRIGGS - SEABURY Ordnance Corp, Sharon, Pa.
(See page 227.)

DUNLAP Engineering Co., Columbus, O.
(See page 595.)

HESS Spring & Axle Co., Carthage, O.

HUPP-TURNER Co., Lycaste St. & R. R., Detroit, Mich.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 225.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LONG Arm System Co., Cleveland, O.

McCUE Co., Hartford, Conn.
(See pages 71 and 291.)

METAL Products Co., Waterloo St. and Detroit Terminal R. R., Detroit, Mich.
(See page 745.)

MOTT Wheel Works, Utica, N. Y.
(See page 699.)

MURRAY Machine Works, 1924 Wabancia Ave., Chicago, Ill.
(See page 557.)

PERU Auto Parts Mfg. Co., Peru, Ind.

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page 489.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

SANDUSKY Auto Parts & Motor Truck Co., Sandusky, O.
(See page 63.)

SMITH CO., A. O., Milwaukee, Wis.
(See page 397.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.
(See page 713.)

SUPERIOR Axle & Forge Co., Buffalo, N. Y.
(See pages 69 and 70.)

TIMKEN Detroit Axle Co., 132 Clark St., Detroit, Mich.

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O.
(See page 579.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

WESTON-MOTT Co., Flint, Mich.
(See page 65.)

REAR AXLES WITH TRANSMISSION

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, O.
(See page 71.)

AMERICAN Die & Tool Co., Reading, Pa.

AMERICAN Gear & Mfg. Co., Jackson, Mich.
(See page 575.)

COVERT Motor Vehicle Co., Lockport, N. Y.

EVANS—See Merchant & Evans Co.

LONG Arm System Co., Cleveland, O.

MERCHANT & Evans Co., 517 Arch St., Philadelphia, Pa. "Evans."

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page 489.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

STONE-PROBST Axle Co., Columbus, O.

STUTZ Auto Parts Co., Indianapolis, Ind.

WARNER Mfg. Co., Toledo, O.
(See page 209.)

BACKS

METAL SEAT BACKS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

MULLINS Co., W. H., 182 Franklin St., Salem, O.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N Y.

BAGS

COAT RAIL BAGS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.
(See page 441.)

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. "Security."
(See page 153.)

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y.
(See page 441.)

SECURITY—See Imperial Brass Mfg. Co.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

WINSHIP, W. W., 71 Summer St., Boston, Mass.

MOTOR CYCLE TOOL BAGS AND BOXES

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y.
(See page 733.)

NATHAN Novelty Mfg. Co, 83-90 Reade St., New York, N. Y.
(See page 441.)

PERSONS Mfg. Co., 54-68 Bloomingdale Rd., Worcester, Mass.

WIDMAYER Co., Frank B., 2312 Broadway, New York, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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SUPERIOR

Automobile Manufacturers

WE are prepared to fill promptly your orders for axles and transmissions—not of the ordinary type now flooding the market, but—axles and transmissions that embody those qualities of excellence which go to make finished products well described by the word "Superior."

All made in a plant where production of quantity never interferes with the Superior Standard of Quality.

Our guarantee (with us more than an empty word) stands back of every piece of work leaving our factory.

Superior Axle & Forge Co.
BUFFALO NEW YORK

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SUPERIOR

Commercial and Pleasure Vehicle

Axles

Drop Forged I-Beam Front Axles
of
Chrome Nickel, Carbon or Vanadium Steel

Pressed Steel Rear Axles

Semi or Full Floating Type

—Transmissions

For All Types of Cars

STANDARD BEARINGS AS ORDERED

We are building Axles and Transmissions, and they are building business for us.

Superior Axle & Forge Co.

BUFFALO *NEW YORK*

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FRONT **AXLES** REAR

OF QUALITY

LET US HELP IN SOLVING THAT

MANUFACTURING PROBLEM

¶ BY FURNISHING YOUR AXLE EQUIPMENTS IN CAR LOAD LOTS AS YOU NEED THEM AND WHEN YOU NEED THEM

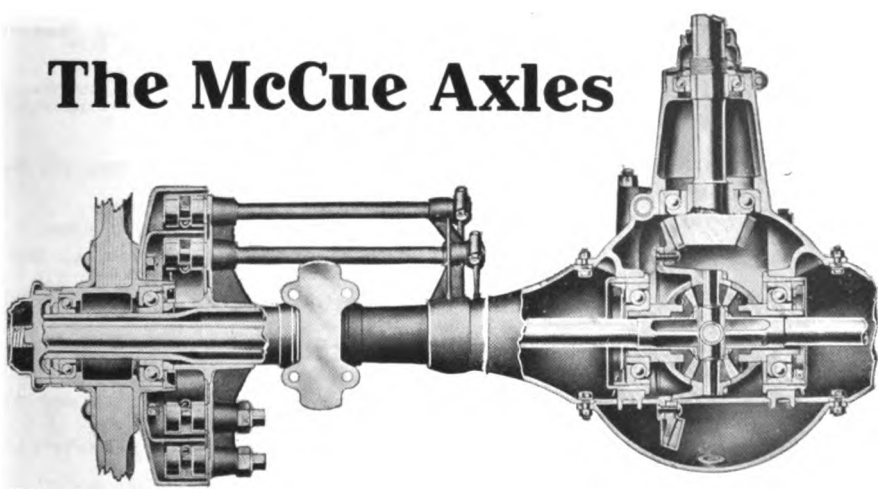
¶ OUR STANDARD EQUIPMENTS INCLUDE ALL THE IMPROVED TYPES IN USE

¶ I BEAM OR TUBULAR FRONTS CHAIN OR BEVEL DRIVE REARS CUP AND CONE—ANNULAR OR ROLLER TYPE BEARING

¶ WE ARE SPECIALISTS IN THIS LINE AND OUR EXPERIENCE IS AT YOUR DISPOSAL

THE AMERCAN BALL BEARING CO.
L. S. & M. S. RY. & EDGEWATER PARK
CLEVELAND, OHIO

The McCue Axles



Have you seen our one-piece steel axle housing? It is unlike any other. It is made right ooks right and is right.
The McCue axles cost more than any others but they are worth more. Every little detail has been looked after from a car-builder's standpoint.
They have real brakes which are easily and quickly adjusted.
The drum bearing surfaces of the flanges are accurately machined; The flange bearing surfaces of the drums are likewise machined, making a true running wheel possible, also permitting the use of various widths of spokes.
The pinion shaft and pinion gear are integral and are made of 3 ½% nickle steel.
The bearings are imported annulars and of sufficient sizes to carry the load for the weight of car for which the axles are intended with a factor of safety of ten.
These bearings have been tested out with 100% overload for 110,000 miles and were in good usable condition at the end of the test.
We have both Mercedes and Elliott types of front axles. Let us tell you all about them. Prints and catalogues upon application.

THE McCUE COMPANY, Hartford, Conn.

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BAGS (Continued)

RUBBER GAS BAGS

DABOL Rubber Co., Providence, R. I.

DIAMOND Rubber Co., Akron, O. **(See page 139.)**

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

NATIONAL India Rubber Co., Bristol, R. I.

SEAMLESS Rubber Co., New Haven, Conn. **(See page 567.)**

TOOL BAGS OR ROLLS

(For Tool Boxes—See Boxes, Tool)

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y. **(See page 441.)**

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

CHANNON Co., H., Market & Randolph Sts., Chicago, Ill.

COOK & Bro., E. C., 326-30 Kinzie St., Chicago, Ill.

ECONOMY Stay Co., 1017 Lucas Ave., St. Louis, Mo.

EUSTICE, Bert M., 54-56 Lafayette Ave., Detroit, Mich.

EXCELSIOR Bag & Mfg. Co., Troy, N. Y.

FEESER Co., Frank S., 1104 Prospect St., Indianapolis, Ind.

GALEWSKI & Son, A., 323 Broadway, New York, N. Y.

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOPEWELL Bros., 29 Chapel St., Newton, Mass. **(See page 767.)**

M. & E. Mfg. Co., Ashland, O.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland O.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y. **(See page 441.)**

PERKINS-CAMPBELL Co., Cincinnati, O. **(See page 411.)**

PLANET Co., Westfield, Mass.

PONTIAC Auto Accessories Co., Osmond Bldg., Pontiac, Mich.

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y. **(See page 441.)**

SPRINGFIELD Harness Co., 27-29 Dwight St., Springfield, Mass.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

BALLAST

IRON AND LEAD BALLAST

CHADWICK-BOSTON Lead Co., 162 Congress St., Boston, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N Y.

BALLOONS

SPHERICAL BALLOONS

(For Dirigibles—See Balloons, Dirigible)

BUMBAUGH, G. L., 2008 N. Capitol Ave., Indianapolis, Ind.

FRENCH-AMERICAN Balloon Co., St. Louis, Mo.

KING, S. A., 5134 Ridge Ave., Philadelphia, Pa.

STEVENS, Leo, Madison Sq., New York, N. Y.

BALLS

STEEL BALLS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

ATLAS Ball Co., Merchantville, N. J. **(See page 689.)**

AUBURN Ball Bearing Co., 27 Elizabeth St., Rochester, N. Y. **(See page 757.)**

BANTAM Anti-Friction Co., Bantam, Conn. (Importers.) "H. & H." **(See page 355.)**

BARTHEL, Daly & Miller, 42 Broadway New York, N. Y. (Importers.) "Fischer." **(See inside front cover.)**

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) **(See page 81.)**

FISCHER—See Barthel, Daly & Miller.

FLANDERS Mfg. Co., Pontiac, Mich. **(See pages 123, 124 and 545.)**

GRANT-HOOVER Ball Co., Merchantville, N. J.

H. & H.—See Bantam Anti-Friction Co.

NEW Departure Mfg. Co., Bristol, Conn.

PRESSED Steel Mfg. Co., 504 Land Title Bldg., Philadelphia, Pa.

R. I. V. CO., 1771 Broadway, New York, N. Y. (Importers.) **(See page 621.)**

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa. **(See page 713.)**

BAMBOO

AEROPLANE BAMBOO

DELTOUR, J., 49 Sixth Ave., New York, N. Y. (Importer.)

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LIGGETT LIGGETT

SPRINGS

Vanadium, Crucible Carbon, Open-hearth Carbon

All springs are scientifically heat treated, and carefully tested by specially designed machines. Furnished in all styles and sizes.

AXLES

Front.—I-beam and flat forged for both pleasure and commercial vehicles. Equipped with roller bearings.

Rear.—Shaft drive. Floating type equipped throughout with roller bearings. Double internal expanding brakes.

Rear.—Chain drive. I-beam or square forged. Complete with hubs, roller bearings, brakes and sprockets, or plain forgings as desired.

Universal Joints, Forgings, Screw Machine Work
Pipe Strainers, Tank Strainers
Brass Couplings, Tees, Elbows and Ball Check Valves

Our standard parts are the result of exhaustive study and research by both scientific and practical men skilled in the various arts.

We will cheerfully answer all inquiries.

Liggett Spring & Axle Company

Spring and Forging Plant
Monongahela, Pa.

GENERAL OFFICE
Park Building
PITTSBURG

Auto-Parts Plant
Cleveland, O.

LIGGETT LIGGETT

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BANDING

BRAKE BANDING OR LINING

(For Lining Brakes or Clutches—See also Leather Friction; also Belting, Leather; also Fibre, Hard)

AJAX—See Calmon Asbestos & Rubber Works of America.

AMBLER—See Keasbey & Mattison Co.

ATKINS & Co., E. C., South & Illinois Sts., Indianapolis, Ind. "F.O.E."

AUTOBESTINE—See Woven Steel Hose & Rubber Co.

CALMON Asbestos & Rubber Works of America, 4 Cliff St., New York, N. Y. "Ajax."

CAMEL HAIR—See Rossendale-Reddaway Co.

CAREY Co., Phillip (Lockland), Cincinnati, O.

DUCKWALL Belting & Hose Co., 123 W. Maryland St., Indianapolis, Ind. "Durobestos."

DUROBESTOS—See Duckwall Belting & Hose Co.

EDKIN—See Germann Bronze Co.

ELECTRA—See Horton Mfg. Co.

EVERLAST—See National Leather Belting Co.

F.O.E—See Atkins & Co.

GANDY Belting Co., 723 W. Pratt St., Baltimore, Md.

GERMANN Bronze Co., Erie Pa. "Edkin."
(See page 133.)

GRIP-ON—See New York Leather Belting Co.

HORTON Mfg. Co., F. L., 45 Milk St., Boston, Mass. "Electra."
(See page 703.)

J-M NON-BURN—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J-M Non-Burn."

KEASBEY & Mattison Co., Ambler, Pa. "Ambler."

KNOWLES Co., 44-48 Union Sq., Bridgeport, Conn. "Sa Bestso."

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

MULTIBESTOS—See Multiple Woven Hose & Rubber Co.

MULTIPLE Woven Hose & Rubber Co., Worcester, Mass. "Multibestos."
(See page 625.)

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y. "Everlast."

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y. "Grip-on."

RAYBESTOS—See Royal Equipment Co.

ROSSENDALE-REDDAWAY Belting & Hose Co., Newark, N. J. "Camel Hair."

ROYAL Equipment Co, 440 Housatonic Ave., Bridgeport, Conn. "Raybestos," "Staybility."
(See page 103.)

SA BESTSO—See Knowles Co.

SCANDINAVIA Belting Co., 127-29 White St., New York, N. Y.

STABILITY—See Royal Equipment Co.

THERMOID Rubber Co., Trenton, N. J.
(See page 609.)

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Autobestine."
(See page 651.)

BANDS

NON-SKID BANDS

(See also Treads, Detachable. For Tire Chains—See Chains, Tire)

BROWN Mfg. & Garage Co., J. C., Butler, Ind.

HERCULES—See Republic Rubber Tire & Shoe Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 75.)

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y.
(See page 733.)

MID-WEST Motor Supply Co., 554 W. Jackson Blvd., Chicago, Ill.

PERFECTION Non-Skid Climber Co., Edon, Ohio.

REPUBLIC Rubber Tire & Shoe Co., 794-98 Tenth Ave., New York, N. Y. "Hercules."

WALKER Auto Tire Band Co., 728 S. East St., Indianapolis, Ind.

WOODWORTH—See Leather Tire Goods Co.

BAROMETERS

BAROMETERS AND THERMOMETERS

GREEN, Henry, 1191 Bedford Ave., Brooklyn, N. Y.

KEUFFEL & Esser Co., 129 Fulton St., New York, N. Y.

MERRILL'S Sons, R., 66 South St., New York, N. Y.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

TAYLOR Instrument Cos., Rochester, N. Y.

WAGNER, Carl H., 1944 N. Albany Ave., Chicago, Ill.

WAGNER Glass Works, 697-99 E. 132d St., New York, N. Y.

WEINHAGEN, Henry, 22 N. William St., New York, N. Y.

BARS

MOTOR CYCLE HANDLE BARS

CHICAGO Handle Bar Co., Shelby, O.

REESE Machine & Tool Works, 224-30 W. Main St., Plymouth, Pa.

BASKETS

TOURING BASKETS

(See Hampers, Touring)

Complete Index to Classification appears on Pages 8 to 22.

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WOODWORTH
TREADS, KANT-SKIDS AND REPAIR BOOTS

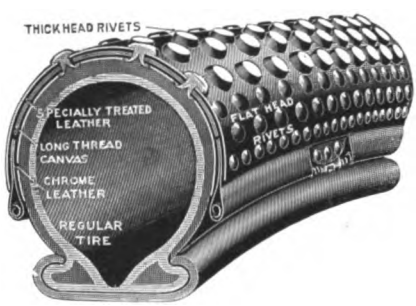
The 1911 Woodworth Treads are made of chrome leather treated by a new process that makes it impervious to the action of dirt and water. The Treads are studded on the middle with thick head rivets and on the sides with flat head rivets to protect the leather in ruts.

The 1911 Woodworth Treads are held on the tire by very strong coil springs along the sides connected by turn-buckle screws which enable the user to adjust them perfectly to the different makes of tires, which vary considerably in size.

Woodworth Treads are practically puncture-proof, are an excellent non-skid and protect the tires from all cuts, bruises and similar injuries, reducing tire expense about one-half. They are easy to apply and fit all makes of tires.

Price List of 1911 Woodworth Treads

Size	Price each	Size	Price each	Size	Price each
26x2½	$8.70	32x3½	$18.90	35x4½	28.50
28x2½	9.90	34x3½	20.40	36x4½	29.40
30x2½	11.10	36x3½	21.90	37x4½	30.50
26x3	11.70	30x4	20.40	42x4½	35.70
28x3	12.90	31x4	21.30	34x5	30.30
30x3	14.10	32x4	22.20	36x5	32.70
32x3	15.30	33x4	23.10	37x5	33.90
34x3	16.50	34x4	24.00	38x5	35.10
36x3	17.70	35x4	24.90	40x5	37.50
28x3½	15.90	36x4	25.80	36x5½	35.70
30x3½	17.40	32x4½	25.20	38x5½	38.40
31x3½	18.30	34x4½	27.30	40x5½	41.10



Motor Cycles must have a clearance of at least one-half inch on each side of the tires in order to use the treads. If the frame or belt is closer than this the treads cannot be used.

Kant-Skids are used in place of tire chains. The cross members are made from heavy steel stampings. They present a perfectly smooth rounded surface to the tire that cannot possibly wear on injure it. The side of the Kant-Skids that comes on the road has thin edges that grip firmly on any road, even the hardest ice or pavements.

They wear much longer than Chains and save the tire enough to pay double their cost.

Price of Kant-Skids

Size	Per Pair	Size	Per Pair
28x3	$4.00	37x4	$8.00
30x3	4.50	40x4	10.00
32x3	5.00	30x4½	6.50
34x3	5.50	32x4½	7.00
36x3	6.00	34x4½	7.50
28x3½	4.50	35x4½	8.00
30x3½	5.00	36x4½	8.00
32x3½	5.50	37x4½	8.75
34x3½	6.00	38x4½	9.50
36x3½	6.50	40x4½	11 00
30x4	5.50	42x4½	12.50
31x4	6.00	34x5	8.50
32x4	6.00	35x5	9.00
33x4	6.50	36x5	9.00
34x4	7.00	37x5	9.75
35x4	7.50	38x5	10.50
36x4	7.50		

Price of Single Kant-Skids

3 or 3½ in. 50c each, $6.00 doz.
4 or 4½ in. 65c " 7.80 "
5 or 5½ in. 75c " 9.00 "

LEATHER TIRE GOODS CO.

NIAGARA FALLS, N. Y.

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BATTERIES

DRY BATTERIES

ACME—See Nungesser Electric Battery Co.

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

ANHYDROUS Battery Co., 222-24 Canal St., Chicago, Ill.

ARGUS Battery Co., Willimantic, Conn.

AUTOCRAT—See Stackpole Battery Co.

BLACK CAT—See Englewood Carbon Works.

BUNNELL & Co., J. H., 20 Park Pl., New York, N. Y. "Jove."

BURN-BOSTON Battery & Mfg. Co., Doane St., Boston, Mass.

COLUMBIA—See National Carbon Co.

DELTA Mfg. Co., Bloomfield, N. J.

DIAMO—See Universal Carbon Co.

ENGLEWOOD Carbon Works, State & 65th Sts., Chicago, Ill. "Black Cat," "Xcell."

EVER READY—See American Ever Ready Co.

FLEUR-DE-LIS—See French Battery & Carbon Co.

FRANKLIN—See Universal Carbon Co.

FRENCH Battery & Carbon Co., Madison, Wis. "Fleur-de-Lis."

HAWTHORNE—See Western Electric Co.

HI PO—See Lincoln Electric Co.

HI-UP—See Manhattan Electrical Supply Co.

JOVE—See Bunnell & Co.

LINCOLN Electric Co., 1-3 Union Sq., New York, N. Y. "Hi Po."

LUTZ-LOCKWOOD Mfg. Co., Aldena, N. J. "S-X."

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y. "Red Seal," "Hi-Up."
(See page 615.)

NATIONAL Carbon Co., Cleveland, O. "Red Top," "Columbia."
(See page 333.)

1900—See Nungesser Electric Battery Co.

NUE—See Union Battery Co.

NUNGESSER Electric Battery Co., 3519 King Ave., Cleveland, O. "Rapid Fire." "1900." "Acme."

RAPID FIRE—See Nungesser Electric Battery Co.

RED SEAL—See Manhattan Electrical Supply Co.

RED SHIELD—See Wesco Supply Co.

RED STAR—See White Star Battery Co.

RED TOP—See National Carbon Co.

ROCK Island Battery Co., Ninth & Sycamore Sts., Cincinnati, O.

S-X—See Lutz-Lockwood Mfg. Co.

SHEPARD Dry Battery Co., S. S., 114 Bedford St., Boston, Mass.

STACKPOLE Battery Co., St. Marys, Pa. "Autocrat," "Wizard."
(See page 653.)

STANDARD Carbon Co., Los Angeles, Cal. "Western Ignitor."

UNION Battery Co., Belleville, N. J. "Nue."

UNIVERSAL Carbon Co., Ashland, Mass. "Diamo," "Franklin."

WASHINGTON Automobile Supply Co., Washington, Ill.
(See page 631.)

WATERBURY Battery Co., 1036 S. Main St., Waterbury, Conn.

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill. "Hawthorne."

WESTERN IGNITOR—See Standard Carbon Co.

WHITE Star Battery Co., 126 Chambers St., New York, N. Y. "Red Star."

WIZARD—See Stackpole Battery Co.

XCELL—See Englewood Carbon Works.

STORAGE BATTERIES

(Including both Vehicle and Ignition Batteries)

AJAX Battery Co., 1532 Michigan Ave., Chicago, Ill.
(See page 653.)

ALVERN Battery Co., 211 E. Pennsylvania St., Evansville, Ind.

AMERICAN Battery Co., 1132-34 Fulton St., Chicago, Ill. "Invincible."

AMERICAN Storage Battery Co., Cambridge, Mass. "Harvard."
(See page 347.)

AMPVO Battery Co., 16th St. & Michigan Ave., Chicago, Ill. "Economy."
(See page 79.)

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 639.)

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill. "Square."

ASTRAL Storage Battery Co., 713 W. Jackson Blvd., Chicago, Ill.

AUTEX—See Willard Storage Battery Co.

AUTO Battery & Electrical Co., 119 W. Tupper St., Buffalo, N. Y.
(See page 333.)

AVERY Portable Lighting Co. Milwaukee, Wis. "Electrobola."

B. & S.—See Brown-Smith Battery Co.

BENOIST-BUEL Co., 3923 Olive St., St. Louis, Mo. "Black Jack."

BISON Storage Battery Co., 38 Riley St., Buffalo, N. Y. "Marx."

BLACK JACK—See Benoist-Buel Co.

BROWN-SMITH Battery Co., 415 E. Seventh St., Bloomington, Ind. "B. & S."

CHLORIDE—See Electric Storage Battery Co.

CHURCHER Electric & Mfg. Co., 132 Opera Pl., Cincinnati, O.

COMBAT—See Hall Storage Battery Co.

CUYAHOGA—See Lawrence Storage Battery Co.

DAY & Night Battery Co., Danvers, Mass.

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O. "Hubler-Dayton."

EASTERN Battery Co., 42 Thurston St., Pawtucket, R. I.

ECONOMY—See Ampvo Battery Co.

Complete Index to Classification appears on Pages 8 to 22.

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Greater Capacity Higher Voltage Brighter Lights

For Automobile Lighting

THE SALOM STORAGE BATTERY represents the one great advance that has been made in storage battery science since 1882. Radically new methods of plate construction and design have resulted in a gain in efficiency and length of service—life that places the Salom Battery in a class apart.

SALOM STORAGE BATTERIES are ideal for automobile service. In a small compass they contain greater light-producing energy than any other source of illuminating power known to science. They last twice as long as ordinary batteries and give 25% more current and 5% higher voltage than any other type of battery.

Manufacturers and dealers will appreciate the advantage and convenience of an automobile light that can be switched on or off from the seat, that presents no danger of explosion, needs no attention, and furnishes light of unvarying brilliancy and power at a minimum cost.

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BATTERIES (Continued)

STORAGE BATTERIES (Continued.)

EDISON Storage Battery Co., 131 Lakeside Ave., Orange, N. J. (See page 97.)

ELBA—See Willard Storage Battery Co.

ELECTRIC Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa. "Chloride." "Exide."

ELECTRIC Supply & Battery Co., 7510 Woodland Ave., S. E., Cleveland, O.

ELECTROBOLA—See Avery Portable Lighting Co.

EMPIRE Battery Co., 1876 Broadway, New York, N. Y.

ESSEX Storage Battery & Supply Co., 272 Halsey St., Newark, N. J.

EXCEL—See Kuehn & Metz.

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill. "XLCR."

EXIDE—See Electric Storage Battery Co.

FEDERAL Mfg. Co., 194 Cushing St., Lowell, Mass. "Rex."

FIRE FLY—See Hoosier Storage Battery Co.

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y. "Midget." (See page 653.)

GODFREY Storage Battery Co., 129 S. Beatty St., Pittsburg, Pa.

GOULD Storage Battery Co., 345 Fifth Ave., New York, N. Y. (See page 779.)

HARVARD—See American Storage Battery Co.

HEISSLER Storage Battery Co., 1425 Michigan Bldg., Chicago, Ill.

HELIOS Mfg. Co., Bridesburg, Philadelphia, Pa.

HIRSCH—See Penn Storage Battery Co.

HOBO—See Hoosier Storage Battery Co.

HOOSIER Storage Battery Co., 212-16 E. Penn. St., Evansville, Ind. "Fire Fly." "Hobo."

HUBLER-DAYTON—See Dayton Electrical Mfg. Co.,

INDUSTRIAL Storage Battery Co., 100 William St., New York, N. Y.

INTERNATIONAL Battery Co., 1531 N. Halsted St., Chicago, Ill.

INVINCIBLE—See American Battery Co.

IRISH—See Motor Car Supply Co.

JEWEL Electric Co., 271-73 Michigan Ave., Chicago, Ill.

K. C.—See Kitsee Storage Battery Co.

KEELER Battery Co., 134 Ontario St., Toledo, O.

KITSEE Battery Co., 42 S. Baltimore St., Wilkes-Barre, Pa. "K. C."

KNOP Battery Co., 60 Atwater St., E. Detroit, Mich. "Michigan," "Wizard." (See page 413.)

KUEHN & Metz., 1926 Broadway, New York, N. Y. "Excel."

LAWRENCE Storage Battery Co., 2343 Euclid Ave., Cleveland, O. "Cuyahoga." (See page 779.)

LEMKE Electric Co., 280-82 Lake St., Milwaukee, Wis.

MARX—See Bison Storage Battery Co.

MICHIGAN—See Knop Battery Co.

MIDGET—See Geiszler Bros. Storage Battery Co.

MILLER Storage Battery Co., 212 Michigan St., Toledo, O.

MILWAUKEE Auto Specialty Co., 152 2d St., Milwaukee, Wis. "Radium." (See page 615.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill. "Irish."

MOUND City Battery Co., 5611 Page St., St. Louis, Mo.

MULLER, Albert, Hoffman Blvd. & Hillside Ave., Jamaica, N. Y. "Porox." (See page 79.)

NATIONAL—See United States Light & Heating Co.

NIAGARA Lead & Battery Co., Niagara Falls, N. Y. "Salom." (See page 77.)

NORTHWESTERN Storage Battery Co., Milwaukee, Wis. (See page 333.)

OSWALD Co., C. J., 147 Ionia St., Grand Rapids, Mich.

PENN Storage Battery Co., 13th & Callowhill Sts., Philadelphia, Pa. "Hirsch."

PERFECTION Igniter Mfg. Co., 1175 Bedford Ave., Brooklyn, N. Y.

PHILADELPHIA Storage Battery Co., Ontario & C Sts., Philadelphia, Pa. (See page 679.)

POROX—See Muller, Albert.

PUMPELLY Storage Battery Co., 1202 E. 22d St., Indianapolis, Ind.

RADIUM—See Milwaukee Auto Specialty Co.

REFLEX Ignition Co., 6919 Lexington Ave., Cleveland, O.

RELIABLE—See Storage Battery Supply Co.

RELIANCE—See Storage Battery Supply Co.

REX—See Federal Mfg. Co.

RUMSEY Electric Co., 327 E. Jefferson Ave., Detroit, Mich.

SALOM—See Niagara Lead & Battery Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SILICIA Storage Battery Co., 29 W. 23d St., New York, N. Y.

SILVER Storage Battery Co., 38 E. Fifth St., Dayton, O.

SPRAGUE-Waldo Mfg. Co., 19-23 Harper Ave., Detroit, Mich, (See page 255.)

SQUARE—See Ashbrook, J. F.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y. "Reliance," "Reliable."

STORAGE Battery Works of America, 1352 Sedgwick St., Chicago, Ill. "Edsonia."

TRAY Plate Battery Co., Binghamton, N. Y. (See page 79.)

UNITED States Light & Heating Co., 30 Church St., New York, N. Y. "National."

UNIVERSAL Electric Storage Battery Co., 301-09 N. Peoria St., Chicago, Ill.

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

VIVAX Storage Battery Co., 2228 Michigan Ave., Chicago, Ill.

VOLKCAR Storage Battery Co., 2441 Michigan Ave., Chicago, Ill.

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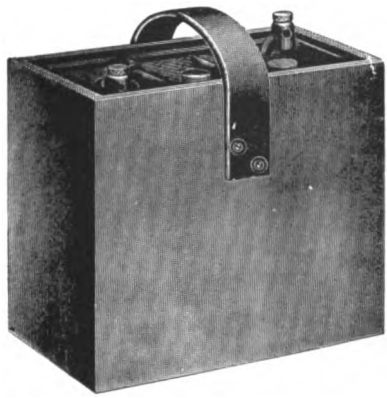

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STORAGE BATTERIES (Continued.)

WILLARD Storage Battery Co., Marquette & Lakeside Aves., Cleveland, O. "Autex," "Elba."

WINTER Battery Co., 1806 Michigan Ave., Chicago, Ill.

WITHERBEE Igniter Co., Springfield, Mass.
(See page 163.)

WIZARD—See Knop Battery Co.

WOOLCOCKS, Geo. O., 69 Beekman St., New York, N. Y. "Yankee."

XLCR—See Excelsior Supply Co.

YANKEE—See Woolcocks, Geo. O.

ZOAR Battery Co., Zoar, O.

BEARINGS

BALL BEARINGS

(For Bearing Parts—See Balls, Steel; also Cups, Ball, also Retainers, Ball)

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, O.
(See page 71.)

AUBURN Ball Bearing Co., 27 Elisabeth St., Rochester, N. Y.
(See page 757.)

B. K. F.—See Lehman Mfg. Co.

B. L. Co., Norwich, Conn.
(See page 83.)

BANTAM Anti-Friction Co., Bantam, Conn.
(See page 355.)

BARTHEL, Daly & Miller, 42 Broadway, New York, N. Y. (Importers.) "Schafer."
(See inside front cover.)

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) "F. & S."
(See page 81.)

CAMERON Co., F. F., Hinsdale, N. H.

CRESCENT—See Evans-Coppins & Starks Co.

CHAPMAN Ball Bearing Co., 40 Bristol St., Boston, Mass.

D. W. F.—See Hess-Bright Mfg. Co.

EVANS-COPPINS & Starks Co., Main & Peru Sts., Princeton, Ill. "Crescent."

F & S—See Bretz Co.

GURNEY Ball Bearing Co., Jamestown, N. Y.

H-B—See Hess-Bright Mfg. Co.

HESS-BRIGHT Mfg. Co., 2101 Fairmount Ave., Philadelphia, Pa. "H-B." "D. W. F."
(See page 717.)

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) "R. B. F."
(See pages 613 and 709.)

LEHMAN Mfg. Co., J. H., 500 Fifth Ave., New York, N. Y. (Importers.) "B.K.F."

MAKUTCHAN Roller Bearing Co., 56 Fifth Ave., Chicago, Ill.

MARBURG Bros., 1777 Broadway, New York, N. Y. (Importer.) "S. R. O."

NEW Departure Mfg. Co., Bristol, Conn.

PRESSED Steel Mfg. Co., 504 Land Title Bldg., Philadelphia, Pa.

R. B. F.—See International Engineering Co.

R. I. V. Co., 1771 Broadway, New York, N. Y. (Importers.)
(See page 621.)

RHINELAND Machine Works Co., 140 W. 42d St., New York, N. Y.
(See page 713.)

S.K.F. Ball Bearing Co., 50 Church St., New York, N. Y. (Importers.)
(See page 713.)

S.R.O.—See Marburg Bros.

SCHAFER—See Barthel, Daly & Miller.

SPARKS-WITHINGTON Co., Jackson, Mich.
(See page 574.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.
(See page 713.)

STAR Ball Retainer Co., Lancaster, Pa.
(See page 113.)

SUSPENSION Roller Bearing Co., Sandusky, O.

U. S. Ball-Bearing Mfg. Co., Harrison St. & Clarence Ave., Oak Park, Ill.

WORCESTER Pressed Steel Co., Barbers Crossing, Worcester, Mass.

ROLLER BEARINGS

BANTAM Anti-Friction Co., Bantam, Conn.
(See page 355.)

BOWER Roller Bearing Co., Detroit, Mich.
(See page 613.)

DETROIT Roller Bearing Co., Detroit, Mich. "Zahn."

GILLETTE—See Peters Mfg. Co.

GLOBE Anti-Friction Roller-Bearing Co., 1110 Broadway, New York, N. Y.

HYATT Roller Bearing Co., Detroit, Mich.
(See page 721.)

MAKUTCHAN Roller Bearing Co., 56 Fifth Ave., Chicago, Ill.

MOSSBERG—See Standard Machinery Co.

PETERS Mfg. Co., R. G., Grand Rapids, Mich. "Gillette."

SPARKS-WITHINGTON Co., Jackson, Mich.
(See page 574.)

STANDARD Machinery Co., 7 Beverly St., Providence, R. I. "Mossberg."

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia. Pa.
(See page 713.)

SUSPENSION Roller Bearing Co., Sandusky, O.

TIMKEN Roller Bearing Co., Canton, O.
(See page 731.)

ZAHN—See Detroit Roller Bearing Co.

STERN BEARINGS

COLUMBIAN Brass Foundry, Freeport, N. Y.

DEAN-ALLEN Mfg. Co. (S. Portland), Portland, Me.

GREEN Bay Machine Co., 1241-43 St. Clair St., Green Bay, Wis.

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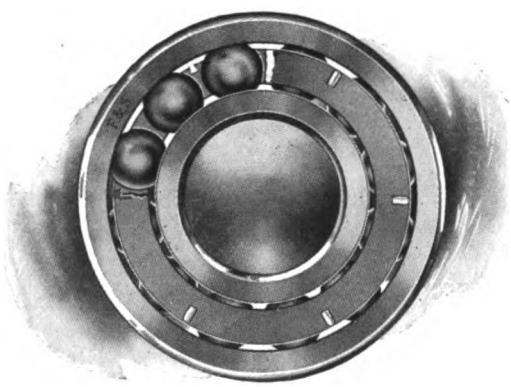

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MARINE Hardware Co., Peabody, Mass.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

NORWALK Brass Co., Norwalk, Conn.

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BINNACLE AND FOG BELLS

BEVIN Bros. Mfg. Co., East Hampton, Conn.

BRYANT & Berry Co., 28 W. Atwater St., Detroit, Mich.

DEAN-ALLEN Mfg. Co. (S. Portland), Portland, Me.

EAST Hampton Bell Co., East Hampton, Conn.

GONG Bell Mfg. Co., East Hampton, Conn. "Merry Widow."

MARINE Hardware Co., Peabody, Mass.

MERRY WIDOW—See Gong Bell Mfg. Co.

WILCOX, Crittenden & Co., 83 Main St., New Haven, Conn.

ELECTRIC BELLS

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Recti."

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y. (See page 615.)

P. R. Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

RECTI—See Edwards & Co.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

ENGINE ROOM SIGNAL BELLS

(See Gongs, Engine Room Signal)

MECHANICAL BELLS OR GONGS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BEVIN Bros. Mfg. Co., East Hampton, Conn.

EAST Hampton Bell Co., East Hampton, Conn.

MOSSBERG Co., Frank, Attleboro, Mass.

NEW Departure Mfg. Co., Bristol, Conn.

MOTOR CYCLE BELLS

BEVIN Bros. Mfg. Co., East Hampton, Conn.

BRISTOL—See New Departure Mfg. Co.

EAST Hampton Bell Co., East Hampton, Conn.

MOSSBERG Co., Frank, Attleboro, Mass.

NEW Departure Mfg. Co., Bristol, Conn. "Bristol."

SMOKE BELLS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

DIEM, Gus A., 20 Fulton St., New York, N. Y.

ROYAL Enameling & Stamping Works, Desplaines, Ill.

BELTING

LEATHER BELTING

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.

APEX Belting Co., 41-43 S. Third St., Philadelphia, Pa.

AQUA—See Shultz Belting Co.

BRADFORD Belting Co., 201 Walnut St., Cincinnati, O. "Monarch."

CHICAGO Belting Co., 113-25 N. Green St., Chicago, Ill.

DETROIT Leather Works, 31-35 Mullett St., Detroit, Mich. "Flexo." (See page 85.)

DUCKWALL Belting & Hose Co., 123 W. Maryland St., Indianapolis, Ind.

FLEXO—See Detroit Leather Works.

GRATON & Knight Mfg. Co., Worcester, Mass. (See page 385.)

HOUGHTON & Co., E. F., 240 Somerset St., Philadelphia, Pa.

HUDSON Belting Co., 1-3 Eaton Pl., Worcester, Mass.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

LADEW, Est. of Edward R., 82-84 Fulton St., New York, N. Y.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

MILWAUKEE Leather Belting Co., Milwaukee, Wis. (See page 261.)

MONARCH—See Bradford Belting Co.

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

PAGE Belting Co., Concord, N. H.

PEERLESS V-Belt Co., 547 W. Jackson Blvd., Chicago, Ill.

PROVIDENCE Belting Co., 25 Charles St., Providence, R. I.

RAHMANN & Co., Geo., 6 Ferry St., New York, N. Y.

RHODES & Sons, J. E., 12 N. Third St., Philadelphia, Pa.

SCHIEREN Co., Chas. A., New York, N. Y. (See page 261.)

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo. "Aqua."

WEATHERHEAD-THOMPSON Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H.

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(For driving Fans or Lubricators)

BROPHY Belting & Supply Co., Hinsdale, Ill.

GILMER Co., 52 N. Seventh St., Philadelphia, Pa.
(See page 85.)

BELTS

MOTOR CYCLE BELTS

APEX Belting Co., 41-43 S. Third St., Philadelphia, Pa.

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

DETROIT Leather Works, 31-35 Mullett St., Detroit, Mich. "Flexo."
(See page 85.)

EMPIRE Tire Co., Mulberry St. and Clinton Ave., Trenton, N. J. "Peerless."

FAUPEL, C. F., 711 Dearborn St., Chicago, Ill.

FLEXO—See Detroit Leather Works.

GRATON & Knight Mfg. Co., Worcester, Mass. "Spartan"
(See page 385.)

MAJESTIC Mfg. Co., 34 Southbridge St., Worcester, Mass. (Importers.) "Wata-Wata."

PEERLESS—See Empire Tire Co.

RAHMANN & Co., Geo., 6 Ferry St., New York, N. Y. "Triumph."

SCHIEREN Co., Chas. A., New York, N. Y.
(See page 261.)

SPARTAN—See Graton & Knight Mfg. Co.

STODDARD, Albert A., Jacksonville, Fla.

TRIUMPH—See Rahmann & Co.

WATA-WATA—See Majestic Mfg. Co.

SPIRAL WIRE BELTS

(For driving Fans or Lubricators)

BIDDISON Mfg. Co., 1516 Williamson St., Madison, Wis. "True Blue."

BULL DOG—See New York Wire & Spring Co.

CALCUTTS—See Gardner Mfg. Co.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

GARDNER Mfg. Co., 5646-48 Ohio St., Chicago, Ill. "Calcutts."

HEBB, Geo. A., 70 William St., Newark, N. J.

KELLEY, A. F., 178 S. Main St., Providence, R. I. "Kello."

KELLO—See Kelley, A. F.

LOMBARDI Motor Co., Derby, Conn.

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

MORGAN Spring Co., Worcester, Mass.
(See page 393.)

NEW York Wire & Spring Co., 586 Washington St., New York, N. Y. "Bull Dog."

PHILADELPHIA Steel & Wire Co., 525 Commerce St., Philadelphia, Pa. "Powco."

POWCO—See Philadelphia Steel & Wire Co.

TRUE BLUE—See Biddison Mfg. Co.

WEBB Mfg. Co., 156-58 Front St., Newark, N. J.
(See page 85.)

BENDINGS

WOOD BENDINGS

ACME Veneer & Body Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J.
(See page 91.)

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

TUCKER Wood Work Co., Sidney, O.

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

BINDING

MAT AND CARPET BINDING

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 635.)

ENGLISH & Mersick Co., New Haven, Conn.

BINNACLES

MOTOR BOAT BINNACLES

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

DIRIGO—See Sherman, Eugene M.

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

HAND & Sons, John, 222 Walnut St., Philadelphia, Pa.

MARINE Compass Co., Bryantville, Mass. "Polaris."

MARINE Hardware Co., Peabody, Mass.

MERRILL'S Sons, R., 66 South St., New York, N. Y.

NEGUS, T. S. & J. D., 140 Water St., New York, N. Y.

POLARIS—See Marine Compass Co.

RIGGS & Bros., 310 Market St., Philadelphia, Pa.

SHERMAN, Eugene M., Reed St., Lexington, Mass. "Dirigo."

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(See Glasses, Marine)

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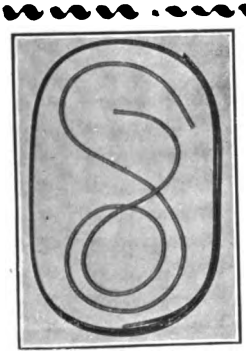

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GEAR BLANKS

(See Gears, Blank)

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COLEMAN & Sons, Walter, 300-12 S. Water St., Providence, R. I.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

McMILLAN'S Sons, W. H., 153 South St., New York, N. Y.

MARINE Hardware & Equipment Co. (S. Portland), Portland, Me.

MERRIMAN Bros., 185 Amory St., Boston, Mass.

UNION Hardware Co., Torrington, Conn.

WESTERN Block Co., Lockport, N. Y.

BLOWERS

HORN BLOWERS

(Foot Bellows for blowing horns—for Electric Horn Blowers—See Horns, Electric)

INLAND Mfg. Co., 50 Mason St., Milwaukee, Wis. "Yale."

KING DODO—See Vaugier Mfg. Co.

VAUGIER Mfg. Co., Wayne St. & P. R. R., Piqua, O. "King Dodo."

YALE—See Inland Mfg. Co.

MOTOR BOAT WHISTLE BLOWERS

BRUNNER Mfg. Co., 14 Jefferson Ave., Utica, N. Y.

CLEVELAND Block Co., 1173 W. 11th St., Cleveland, O.

FANNING & Farrell, 102 Friendship St., Providence, R. I.

TRIMOUNT Rotary Power Co., 144-54 Pearl St., Boston, Mass.

BOATS

MOTOR BOAT TENDERS

ANDERSON, Oscar, East Norwalk, Conn.

CHAMBERLAIN, Wm. H., Marblehead, Mass.

DAVIS Boat Works, ft. Washington St., Sandusky, O.

GAS Engine & Power Co. & Chas. L. Seabury Co. (Morris Heights), New York, N. Y.

JEWETT, M. M., 450 Freeport St. (Dorchester), Boston, Mass.

KERSHAW-WILLIAMS Co., 29-33 Haverhill St., Boston, Mass.

KIDNEY & Sons, Dan, West De Pere, Wis.

LAWLEY & Son Corp., Geo., Neponset, Mass.

MILTON Boat Works, Rye, N. Y.

MURRAY & Tregurtha Co., 340 W. First St. (S. Boston), Boston, Mass.

PETOSKEY Boat Co., 115 Midway, Petoskey, Mich.

POWELL Cove Boat Co., College Point, N. Y.

RACINE Boat Co., Racine, Wis.

RIPLEY Boat Co., 72 Gage St., Augusta, Me.

RIPPLEY Steel Boat Co., Grafton, Ill.

RUDDOCK Boat & Yacht Co., 214th St. & Harlem River, New York, N. Y.

RUSHTON, J. N., 671 Water St., Canton, N. Y.

TOPPAN Boat Mfg. Co., 25 Haverhill St., Boston, Mass.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich.

VALLEY Boat & Engine Co., 2700 River St., Saginaw, Mich.

WEST Mystic Boat Co., West Mystic, Conn.

BODIES

METAL BODIES

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

ABRESCH Co., Charles, Fourth & Poplar Sts., Milwaukee, Wis. (See page 91.)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

AMESBURY Metal Body Co., Chestnut St., Amesbury, Mass.

ARMSTRONG Co., M., 433 Chapel St., New Haven, Conn.

AUTO Rebuilding Co., 222 Ogden St., Indianapolis, Ind.

BAILEY & Co., S. E., Lancaster, Pa.

BARNDT & Johnston Auto Supply Co., 2032 S. High St., Columbus, O. (See page 87.)

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BAUER Steel Body Co., Warren Ave. & 15th St., Detroit, Mich.

BIDDLE & Smart Co., Water St., Amesbury, Mass.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLUE Ribbon Auto & Carriage Co., 154 Cannon St., Bridgeport, Conn.

BREWSTER & Co., Long Island City, N. Y.

BRIDGEPORT Vehicle Co., Holland & Fairfield Aves., Bridgeport, Conn.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BRIGGS Mfg. Co., Clay Ave., Detroit, Mich.

BUFFALO Auto Body & Trimming Co., 108 Terrace, Buffalo, N. Y.

BURR & Co., 209 W. 48th St., New York, N. Y.

CARRIAGE Woodstock Co., Owensboro, Ky.

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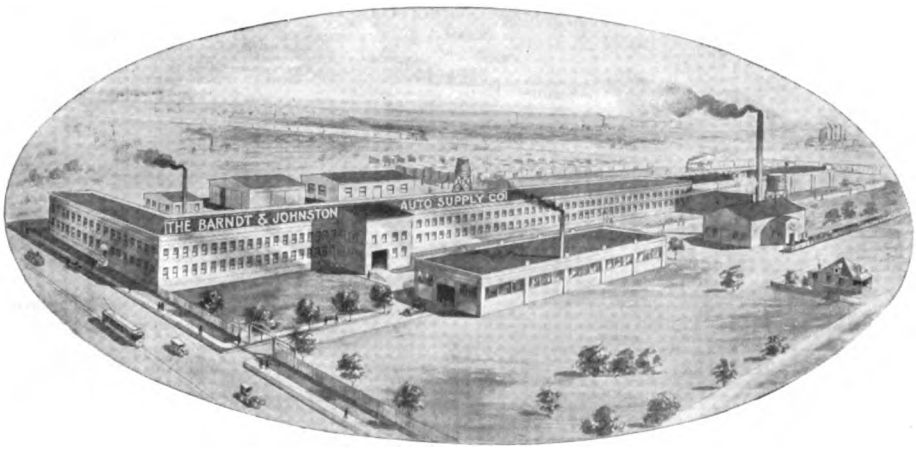

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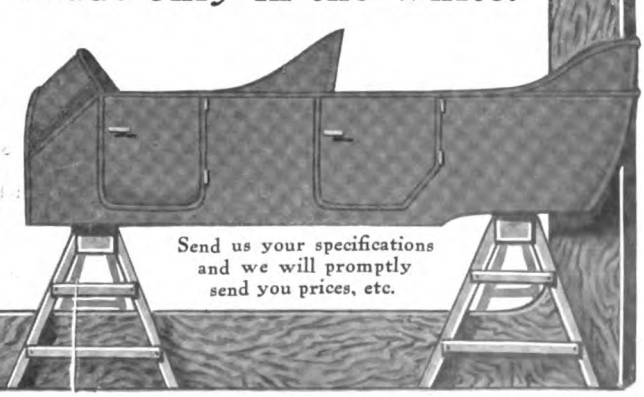

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BODIES (Continued)

METAL BODIES (Continued)

CENTRAL Mfg. Co., Connersville, Ind.

COLLINGS Carriage Co., 108-14 N. Front St., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 229-35 Halsey St., Newark, N. J.

COOLING Carriage Co., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y. (See page 765.)

DAYTON Body Co., 616 Geyer St., Dayton, O.

DENNISTON Co., E. E., 184 W. Mohawk St., Buffalo, N. Y. (See page 437.)

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

DETROIT Carriage Co., 610 Clay Ave., Detroit, Mich.

DUNHAM & Son, D. B., 128 Irving St., Rahway, N. J.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FISHER Body Co., St. Antoine St. & M. C. R. R., Detroit, Mich.

FITZ-GIBBON & Crisp Carriage & Wagon Co., 28-32 Bank St., Trenton, N. J.

FLANDRAU & Co., 406-12 Broome St., New York, N. Y.

FLEETWOOD Metal Body Co., Fleetwood, Pa.

GLASCOCK Bros. Mfg. Co., Muncie, Ind.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See pages 94 and 95.)

HEALEY & Co., 1652 Broadway, New York, N. Y.

HIGHLAND Body Co., Elmwood Pl., Cincinnati, O. (See page 93.)

HOLBROOK Co., 509-15 W. 56th St., New York, N. Y.

HOLLANDER & Morrill, Amesbury, Mass.

IRVIN Mfg. Co., R. J., 233 W. McCarty St., Indianapolis, Ind. (See page 89.)

JUDKINS Co., J. B., Merrimac, Mass.

KAHLER Co., N. Vincennes St. & Monongahela R. R., New Albany, Ind.

KELSEY-HERBERT Co., 570 Kerby Ave., W., Detroit, Mich.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KEYSTONE Vehicle Co., Reading, Pa. (See page 91.)

LA PORTE Carriage Co., La Porte, Ind. (See page 735.)

LAWRENCE & Co., L., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

MICHIGAN Auto Body Co., Milford, Mich.

MILBURN Wagon Co., Toledo, O.

MILLER & Co., A. J., Bellefontaine, O.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

NEW Haven Carriage Co., Water & Franklin Sts., New Haven, Conn.

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PORTLAND Body Works, Portland, Ind.

QUINBY & Co., J. M., Newark, N. J. (See page 91.)

RACINE Boat Mfg. Co., Muskegon, Mich.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. (See page 435.)

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y. (See page 751.)

SIDNEY Mfg. Co., Sidney, O.

SPRINGFIELD Metal Body Co., Springfield, Mass. (See page 89.)

STERLING Co., Lafayette, Ind.

THOMPSON Co., E. J., Forbes Field, Pittsburg, Pa.

UNION City Body Co., Union City, Ind.

UNITED State Metal Products Co., 203 W. 40th St., New York, N. Y.

WILSON Body Co., C. R., Milwaukee Jnc., Detroit, Mich.

WOOD & Son, Frederick R., 217 W. 19th St., New York, N. Y.

WOOP, Wm., 48-50 W. 67th St., New York, N. Y.

YORK Wagon Gear Co., York, Pa.

WOOD BODIES

ABRESCH Co., Charles, Fourth & Poplar Sts., Milwaukee, Wis. (See page 91.)

ACME Veneer & Body Co., Rahway, N. J.

AHR & Rost Co., 1559-69 Gest St., Cincinnati, O.

ALBERT Bros., 11-13 Cannon St., New York, N. Y.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ANTHONY Auto Body Co., 351-55 W. 52d St., New York, N. Y.

ARMSTRONG Co., M., 433 Chapel St., New Haven, Conn.

AUTO Body Co., Lansing, Mich. (See page 93.)

AUTO Body & Specialty Co., 1800 Beach St., Flint, Mich.

AUTO Body & Taxicab Co., Broadway & 51st St., New York, N. Y.

AUTO Top & Body Co., 257-59 N. Broad St., Philadelphia, Pa.

BAILEY & Co., S. E., Lancaster, Pa.

BARNDT & Johnston Auto Supply Co., 2032 S. High St., Columbus, O. (See page 87.)

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

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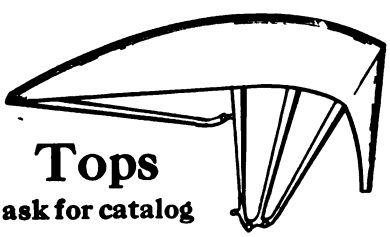

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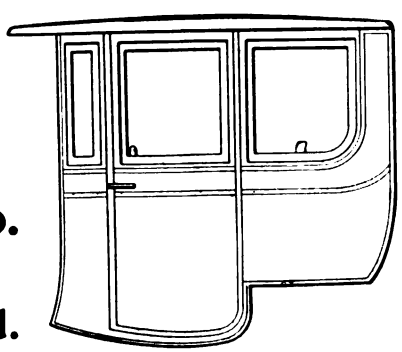

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Indianapolis, Ind.

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BODIES (Continued)

WOOD BODIES (Continued)

BEACON Auto-Body Co., 14th & Alameda Sts., Los Angeles, Cal.

BEAUDETTE Co., O. J., Pontiac, Mich.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLAKESLEE Vehicle Body & Seat Co., Sheffield Station, Kansas City, Mo.

BLUE Ribbon Auto & Carriage Co., 154 Cannon St., Bridgeport, Conn.

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

BREWSTER & Co., Long Island City, N. Y.

BRIDGEPORT Vehicle Co., Holland & Fairfield Aves., Bridgeport, Conn.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROWN Auto-Carriage Co., 3147 Superior Ave., Cleveland, O.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BUFFALO Auto Body & Trimming Co., 108 Terrace, Buffalo, N. Y.

BURR & Co., 209 W. 48th St., New York, N. Y.

CARRIAGE Woodstock Co., Owensboro, Ky.

CARRIAGE Woodwork Co., Hamilton, O.

CENTRAL Mfg. Co., Connersville, Ind.

CHICAGO Carriage & Trimming Co., 1903 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill.

CLARK Carriage Co., Amesbury, Mass.

COLLINGS Carriage Co., 103-14 N. Front St., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 229-35 Halsey St., Newark, N. J.

COOLING Carriage Co., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.
(See page 765.)

CURRIER-CAMERON Co., 85 Elm St., Amesbury, Mass.

CUTTER, J. Frank, 414 Main St., Cambridge, Mass.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DAYTON Body Co., 616 Geyer St., Dayton, O.

DAYTON Folding Tonneau Co., 620-24 Geyer St., Dayton, O.

DEMAREST & Co., A. T., New Haven, Conn.

DENNISTON Co., E. E., 184 W. Mohawk St., Buffalo, N. Y.
(See page 437.)

DES Moines Cabinet Co., 403-09 W. S. Ninth St., Des Moines, Ia.
(See page 93.)

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

DETROIT Carriage Co., 610 Clay Ave., Detroit, Mich.

DUHAMEL & Sons, H., 127-37 Wallabout St., Brooklyn, N. Y.

DUNHAM & Son, D. B., 128 Irving St., Rahway, N. J.

EARL Automobile Works, 1320 S. Main St., Los Angeles, Cal.

EGGERS Veneer Seating Co., F., Two Rivers, Wis.

ELKHART Carriage & Harness Mfg. Co., Elkhart, Ind.

ERBY Carriage & Wagon Co., 323-25 La Salle St., Chicago, Ill.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

FELLWOCK Automobile & Mfg. Co., 3 Upper Fourth St., Evansville, Ind.

FINNESY & Kobler, 26th & Parrish Sts., Philadelphia, Pa.

FISHER, A., 802-10 Fort St., W., Detroit, Mich.

FISHER Body Co., St. Antoine St. & M. C. R. R., Detroit, Mich.

FITZ-GIBBON & Crisp Carriage & Wagon Co., 28-32 Bank St., Trenton, N. J.

FLANDRAU & Co., 406-12 Broome St., New York, N. Y.

FRAZIER & Co., W. S., Aurora, Ill.

FRANTZ Body Mfg. Co., Akron, O.

FULTON & Walker Co., 20th & Filbert Sts., Philadelphia, Pa.

GLESENKAMP Sons & Co., L., 320 Penn Ave., Pittsburg, Pa.

GOOLD Co., James, Broadway & Schuyler St., Albany, N. Y.

GRAVES, G. O., Rahway, N. J.

GREGG Carriage Co., 1926 Arch St., Philadelphia, Pa.

GRISWOLD Motor & Body Co., 660 Commonwealth Ave., Detroit, Mich.

HEALEY & Co., 1652 Broadway, New York, N. Y.

HERZOG Art Furniture Co., Saginaw, W. S., Mich.

HIGHLAND Body Co., Elmwood Pl., Cincinnati, O.
(See page 93.)

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HOLLOPETER & Kormann, 243 Watts St., Philadelphia, Pa.

HOOKER & Co., Henry, 600 State St., New Haven, Conn.

HOWARTH & Rogers, Amesbury, Mass.

HUGHEY & Son, Wm. J., 2518 Michigan Ave., Chicago, Ill.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

HURON Auto Body Co., Port Huron, Mich.

JEWETT-GAMAGE Co., 172-74 Shrewsbury St., Worcester, Mass.

JOHNSON Service Co., Milwaukee, Wis.

JUDKINS Co., J. B., Merrimac, Mass.

KAHLER Co., N. Vincennes St. & Monongahela R. R., New Albany, Ind.

KELSEY-HERBERT Co., 570 Kirby Ave., W., Detroit, Mich.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa.
(See page 91.)

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill.

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KINGSBURY, John, 131-33 Hudson Ave., Albany, N. Y.

KNIGHT-JONES Equipment Co., 2431 Michigan Ave., Chicago, Ill.

LANGE Wagon Co., H., S. St.Clair & Eva Sts., E. E., Pittsburg, Pa.

LA PORTE Carriage Co., La Porte, Ind. (See page 735.)

LARKINS & Co., 276-80 Guerrero St., San Francisco, Cal.

LEITCH Co., James N., Amesbury, Mass.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

LOWELL Auto Body Co., Lowell, Mich. (See page 93.)

McNEAR, George W., 26-30 Cambria St., Boston, Mass.

MAC INNIS Bros., 118-22 22d St., Toledo, O.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MEDIA Carriage Mfg. Co., Media, Pa.

MEYER, George, 1218-20 Second Ave., New York, N. Y.

MICHIGAN Auto Body Co., Milford, Mich.

MILBURN Wagon Co., Toledo, O.

MILLER Bros., Amesbury, Mass.

MONROE Body Co., 901-25 Fort St. W., Detroit, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MUSKEGON Auto Body Co., Muskegon, Mich.

NEW Haven Carriage Co., Water & Franklin Sts., New Haven, Conn.

NICHOLS Co., D. P., Boston, Mass.

NIEDERHUT Carriage Co., 3556-62 Walnut St., Denver, Col.

OLSEN & Son, C. J., Pittsboro, Ind.

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PEASE & Sons, S. C., Main St., Merrimac, Mass.

PETZELT & Keyser, 24th & Locust Sts., Philadelphia, Pa.

PORTLAND Body Works, Portland, Ind.

POWITZKY & Collins Carriage Woodwork Co., St. Louis, Mo.

PULLAR Co., James, 5-13 Mechanic St., Hartford, Conn.

RACINE Boat Mfg. Co., Muskegon, Mich.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

RAMSEY-ALTON Mfg. Co., Portland, Mich.

RECH-MARBAKER Co., Eighth St. & Girard Ave., Philadelphia, Pa.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. (See page 435.)

ROGERS Son & Co., Wm. D., 13th & Cherry Sts., Philadelphia, Pa.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y. (See page 751.)

SCHURMEIER Wagon Co., 29 Western Ave., Minneapolis, Minn.

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SIDNEY Mfg. Co., Sidney, O.

SIEVERS & Erdman, 294-98 Jefferson Ave., Detroit, Mich.

SJOBERG & Co., J. P., 533-59 W. 32d St., New York, N. Y.

SMITH-EGGERS Co., Court St. & Broadway, Cincinnati, O.

SOUTH Bend Spring Wagon & Carriage Co., 210 St. Joe St., South Bend, Ind.

STANDARD Limousine Co., 3145-53 N. Halsted St., Chicago, Ill.

STEHLING, Geo. T., 549-55 Tenth St., Milwaukee, Wis.

STEVENS Mfg. Co., Marinette, Wis.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

STRATTON Carriage Co., C. H., Muncie, Ind.

TEEL Mfg. Co., 132 Main St., Medford, Mass.

THOMPSON Co., E. J., Forbes Field, Pittsburg, Pa.

TROY Mfg. Co., Troy, O.

TUCKER Wood Work Co., Sidney, O.

UNION City Body Co., Union City, Ind.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

WALKER Carriage Co., Merrimac, Mass. (See page 751.)

WALKER-STOOPS Co., A. J., 218-20 W. 65th St., New York, N. Y.

WALKER & Werner, 207-13 Fayette St., Peoria, Ill.

WALL Mfg. Co., R. C., 1334-36 Race St., Philadelphia, Pa.

WAVERLEY Co., Indianapolis, Ind.

WAYMAN & Murphy, Lake & Sangamon Sts., Chicago, Ill.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WERTSCH Co., Wm., 24 Page St., San Francisco, Cal.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WIGGERS Furniture Co., Plum St., Cincinnati, O. (See page 87.)

WILLOUGHBY Co., Utica, N. Y.

WILSON Body Co., C. R., Milwaukee Jnc., Detroit, Mich.

WISCONSIN Wagon Co., 113-23 S. Blair St., Madison, Wis.

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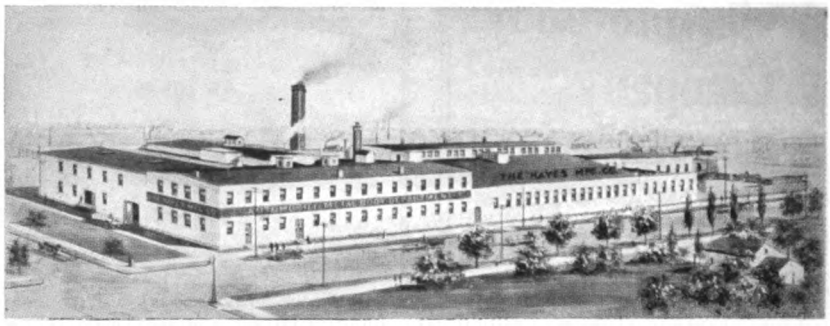

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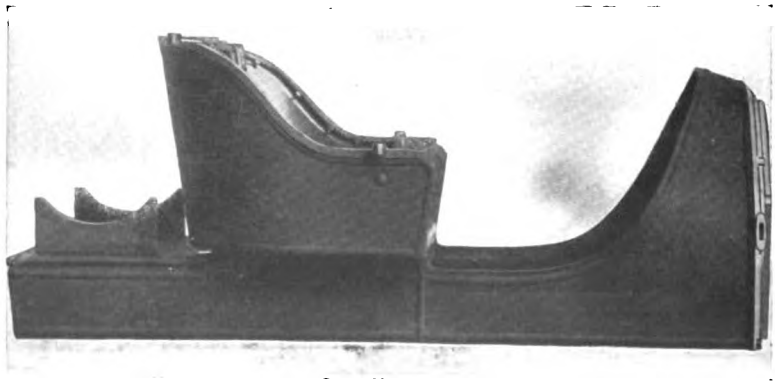

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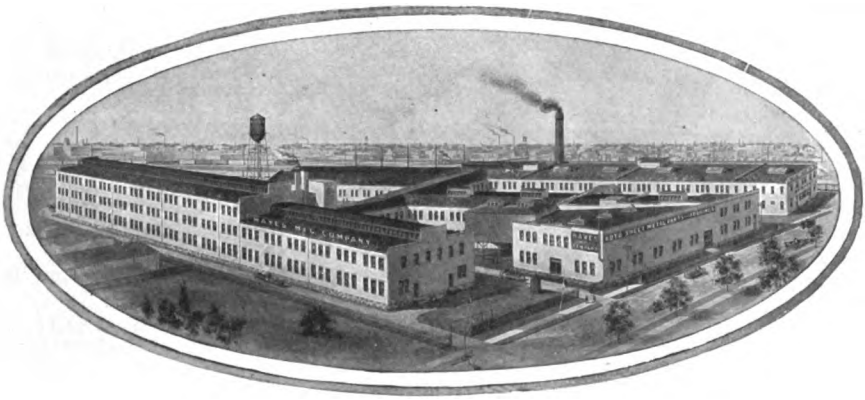

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WOOD BODIES (Continued.)

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WOOP, Wm., 48-50 W. 67th St., New York, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

YORK Wagon Gear Co., York, Pa.

YOUNG Carriage Co., Wm., 4524 Delmar Ave., St. Louis, Mo.

ZIMMERMANN & Sons, F. F., Main St., Waupun, Wis.

BOILERS

AUTOMOBILE STEAM BOILERS

OFELDT & Sons, August, Valley Stream, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

STEAM Carriage Boiler Co., 130 W. First St., Oswego, N. Y.

WALKER Mfg. Co., E. C., Jackson & Lampton Sts., Louisville, Ky.

BOLTS

CAP BOLTS

(See Screws, Cap and Set)

CARRIAGE BOLTS

(See Bolts, Machine and Carriage)

MACHINE AND CARRIAGE BOLTS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

ANCHOR Bolt & Nut Co., Poughkeepsie, N. Y.

CLARK Bros. Bolt Co., Millidale, Conn. (See page 367.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

DETROIT Screw Works, Detroit, Mich. (See page 739.)

FALLS Rivet & Machine Co., Kent, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pitttsburg, Pa.

GRAHAM Nut Co., Pittsburg, Pa.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

HAYDON, A. & M., 304 N. 22d St., Philadelphia, Pa.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

LANZ & Sons, Mathew, 2907 Carson St., Pittsburg, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 365.)

NEW Castle Forge & Bolt Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. Louis Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCRANTON Bolt & Nut Co., Scranton, Pa.

SHELTON Co., Shelton, Conn.

SKELLY'S Philadelphia Bolt Works, T., 24th & Callowhill Sts., Philadelphia, Pa.

STOVE AND TIRE BOLTS

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

CLARK Bros. Bolt Co., Millidale, Conn. (See page 367.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet & Machine Co., Kent, O.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SHELTON Co., Shelton, Conn.

TIRE BOLTS

(See Bolts, Stove and Tire)

BONNETS

MOTOR BONNETS

(See Hoods, Motor)

UNDER BONNETS

(See Pans, Dust)

BOOTS

MOTORISTS OVER BOOTS

AUTOMOBILE Apparel Co., 14 W. 22d St., New York, N. Y.

COHEN, Frank & Co., 763-71 Stone Ave., Brooklyn, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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The New Edison Storage Battery

in actual service, as regular equipment on four of the foremost makes of electric vehicles—Detroit, Bailey, Baker and Waverley—is giving practically three times the mileage formerly obtainable on a single charge.

The new Edison Storage Battery has practically doubled the capacity of a lead battery of equal weight—and while the lead battery constantly deteriorates from the start, the Edison **actually increases** in capacity.

The Edison is not subject to any of the ills common to other storage batteries, and its life is many times as long.

For Electric Lighting of Motor Cars and Motor Boats

The fact that the Edison can be left standing idle for any length of time, either charged or discharged, without injury, that it weighs much less and occupies less space, gives it a big advantage over other storage batteries for this purpose.

For Ignition

The Edison gives a hot blue spark like that of the high tension magneto, but with none of the magneto's disadvantages. The new five cell Edison for ignition purposes is assembled in bent wood tray, encased in steel battery box ready to bolt on the running board.

Write us today for full particulars of the many advantages of the new Edison Storage Battery over all other storage batteries for every battery purpose.

Edison Storage Battery Co., 131 Lakeside Ave., Orange, N. J.

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BOOTS (Continued)

MOTORISTS OVER-BOOTS (Continued.)

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

GROSVENOR—See Worcester Slipper Co.

PUTNAM & Co., A. H., 154 Maple St., Danvers, Mass.

WORCESTER Slipper Co., 369 Park Ave., Worcester, Mass. "Grosvenor."

STEERING KNUCKLE BOOTS

(For enclosing steering connections and universal joints)

DETROIT Leather Works, 31-35 Mullett St., Detroit, Mich.
(See page 85.)

ECONOMY Stay Co., 1017 Lucas Ave., St. Louis, Mo.

FEESER Co., Frank S., 1104 Prospect St., Indianapolis, Ind.

GILBERT Mfg. Co., New Haven, Conn.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

LARAMEE & Grahn, 120 S. Fourth St., Minneapolis, Minn.

MOORE & Steinford, 2317 State St., Chicago, Ill.
(See page 441.)

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

PERKINS-CAMPBELL Co., Cincinnati, O.
(See page 411.)

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y.
(See page 441.)

SMITH-WORTHINGTON Co., Hartford, Conn.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

BOWS

TOP BOWS

BROWN & Co., S. N., 111 S. Commercial St., Dayton, O.

CONESTOGA Bending Works, Lancaster, Pa.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DELPHOS Hoop Co., Delphos, O.
(See page 641.)

DETROIT Bending Co., 1309 Gratiot Ave., Detroit, Mich.

DOWNEY Bros. Spoke & Bending Co., 240 Harrisburg Ave., Lancaster, Pa.

EMPIRE Bending Works, Lancaster, Pa.

LEBZETTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

MOSSMAN, Yarnelle & Co., Fort Wayne, Ind.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

SCHERER & Co., H., Detroit, Mich.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

STARR, D. H., Highland, N. Y.

TOLEDO Bending Co., Toledo, O.
(See page 641.)

UNION Bow Co., 725-35 Superior Ave., N. W., Cleveland, O.

WAYNE Spoke & Bending Works, Fort Wayne, Ind.

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

BOXES

METAL BATTERY BOXES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BECCO—See Beck Co.

BECK Co., Rockville Centre, N. Y. "Becco."
(See page 163.)

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See pages 94 and 95.)

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 383.)

KINWOOD—See Kinsey Mfg. Co.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

WOOD BATTERY BOXES

(See also Holders, Battery)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

CHURCHILL Cabinet Co., 2119 Churchill St., Chicago, Ill.

DELTA Mfg. Co., Bloomfield, N. J.

EBY Auto Parts Co., 470 Lawton Ave., Detroit, Mich.
(See page 687.)

KARREMAN Co., Grand Rapids, Mich.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

RUTLAND Motor Specialty Co., 74 West St., Rutland, Vt.

STANDARD Cabinet Mfg. Co., Peru, Ind.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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GLOBE STEEL TOOL & BATTERY BOXES FOR 1911
THE LARGEST AND MOST VARIED LINE IN AMERICA

B-Style Box
with Aluminum Mat

B 229
Combination

C 208 and Other
C Boxes

Globe Boxes Described

STYLES B and C differ in the radius of the corners, Style B having corners of 1 inch, Style C corners of ⅜-inch radius. In both styles covers are pressed to shape and sides are one piece with seam at the back. The bottoms rest on lugs forming part of the body. All boxes have grommets for battery wires. Measurements in the list below are all INSIDE measurements and depths given do not include depth of cover. Wood Linings, Aluminum Mats, Movable Partitions and Brass Corners are extra and may be had only on boxes with which they are listed as extras. The regular list prices are for boxes with fine Black Enamel Finish and with the Globe patented Brass Lock and Lift combined, except Box B 116 which has a hinged hasp unless Lock is specified at extra cost.

The Globe line of Tool Steel and Battery boxes is the best and most comprehensive line on the market.

Styles and Prices of Globe Boxes

Number	Size Inside	Inside Wood Lining	Price Regular	EXTRAS FOR Wood Lining	Aluminum Mat	Brass Corners
B- 116	10¾ x 6 x 8¼	9 x 5¼ x 7⅝	$2.50	$0.80	.....	.....
B- 127	12 x 6¾ x 9	11¼ x 6 x 8½	3.00	.80	.....	.....
B- 148	13½ x 8 x 8	12½ x 7 x 7⅝	4.00	1.00	$1.50	$1.50
B- 178	16⅜ x 7½ x 9	15½ x 7 x 8¼	4.50	1.25	2.00	1.50
B- 179	16⅝ x 9 x 9½	15¾ x 8¼ x 8⅝	4.50	1.25	2.00	1.50
B- 188	18 x 8 x 9	17 x 7 x 8¼	4.50	1.25	2.00	1.50
B- 229	22 x 9 x 9½	21 x 8¼ x 9	7.00*	1.50	2.50	1.50
B- 229 Combination (see Cut above)			11.00	.....	2.50	1.50
B-2410	24 x 10 x 9½	23¼ x 9 x 9	8.00*	1.50	3.00	1.50
C- 117	10¾ x 7⅛ x 9	10¼ x 6¼ x 8¾	3.50	1 00	.....	.....
C- 119	11½ x 8¾ x 9½	10¾ x 8 x 9	3.70	1.00	.....	.....
C- 166	15¾ x 6½ x 9	15 x 5¾ x 8½	4.00	1.00	.....	.....
C- 168	16¼ x 8½ x 9	15½ x 7¾ x 8½	4.20	1.00	.....	.....
C- 208	20 x 8½ x 9	19¼ x 7¾ x 8½	5.00	1.50	2.50	.....
C- 217 Gas Tank		.....	4.50	.....	.....	.....
C- 217½	21 x 6½ x 8	20¼ x 5¾ x 7¼	5.00	1.50	.....	.....
C- 226	22 x 6 x 8½	21¼ x 5½ x 8	5.00	1.50	2.50	.....

NOTE—Boxes B 116 and B 127 have hinged hasp as a regular fitting, but brass lock may be had as an extra, in which case the list price of either box is 50 cents higher than the regular list.

*Boxes B 229 and B 2410 may be fitted with wood linings which are slotted to hold variable partitions, thus permitting various sizes of compartments. (See next page).

THE GLOBE MACHINE & STAMPING COMPANY, CLEVELAND, OHIO

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BOXES (Continued)

SPARK COIL BOXES

AUTO Body Co., Lansing, Mich. (See page 93.)

CHURCHILL Cabinet Co., 2119 Churchill St., Chicago, Ill.

EGGERS Veneer Seating Co., F., Two Rivers, Wis.

HOUSEHOLD Cabinet Co., 145 Crary St., Providence, R. I.

KARREMAN Co., Grand Rapids, Mich.

MARON, Frank A., 320-22 Pearl St., New York, N. Y.

PLYMOUTH Novelty Mfg. Co., Plymouth, Ind.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

STANDARD Cabinet Mfg. Co., Peru, Ind.

UNION Hardware Co., Torrington, Conn.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

METAL TOOL BOXES

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 99.)

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See pages 94 and 95.)

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 383.)

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., C. H. & D. Ry. & Wheatley St., Cincinnati, O.

MOLINE Pressed Steel Co. (E. Moline) Moline, Ill.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

STOLL Pressed Steel Co., Buffalo, N. Y.

SAND BOXES

(For sanding the road to give traction)

MOSS Co., Augustus S., Sandusky, O.

STUFFING BOXES

BRYANT & Berry Co., 28 W. Atwater St., Detroit, Mich.

COLUMBIAN Brass Foundry, Freeport, N. Y.

GREEN Bay Machine Co., 1241-43 St. Clair St., Green Bay, Wis.

KAUFMANN, Chas., Oshkosh, Wis.

LESTER Co., Fayetteville, N. Y.

MARINE Hardware Co., Peabody, Mass.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

NORWALK Brass Co., Norwalk, Conn.

SPRINGFIELD Motor Co., 310 Grattan St., Chicopee Falls, Mass.

UNDERWATER EXHAUST BOXES

AUTO CRAFT—See Cleveland Auto Boat Mfg. Co.

CAVITO Co., Grand Rapids, Mich.

CLEVELAND Auto Boat Mfg. Co., Cleveland, O. "Auto Craft."

ECHO Motor Boat & Bicycle Co., Delaware & Young Sts., Tonawanda, N. Y.

HYDREX Silent Exhaust Works, 126 Liberty St., New York, N. Y.

THERMEX Silencer Works, 85 Summer St., Boston, Mass.

WOOD TOOL BOXES

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N Y.

EBY Auto Parts Co., 470 Lawton Ave., Detroit, Mich. (See page 687.)

HOUSEHOLD Cabinet Co., 145 Crary St., Providence, R. I.

JORDAN, E. B., Jr., 872 Union St., Brooklyn, N. Y.

MARON, Frank A., 320-22 Pearl St., New York, N. Y.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

STANDARD Cabinet Mfg. Co., Peru, Ind.

TOLLNER'S Sons Co., Chas., Pulaski, N. Y.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

BRACKETS

ADJUSTABLE AND AUTOMATIC LAMP BRACKETS

AUBEUF Co., F. H., Oneida, N. Y.

AUTOMATIC Headlight Co., 299 Broadway New York, N. Y. "Shipley."

CERDA, Arturo G., 170 Summer St., Boston, Mass. "Rotante." (See page 101.)

CIRCLE Rotary Auto Light Co., Great Neck, N. Y.

COX Brass Mfg. Co., Albany, N. Y.

DUNNING & LENHART Mfg. Co., 67th St. & Paschall Ave., Philadelphia, Pa.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

KELLY Handle Bar Co., 5017 Perkins Ave., Cleveland, O.

LUCE Mfg. Co., Dalton, Mass. "Luco."

LUCO—See Luce Mfg. Co.

McKEAN—See Pendleton Auto Garage.

NATIONAL Automatic Light Adjuster Co., Shukert Bldg., Kansas City, Mo.

NORTHWAY, Thomas J., Rochester, N. Y "Rochester."

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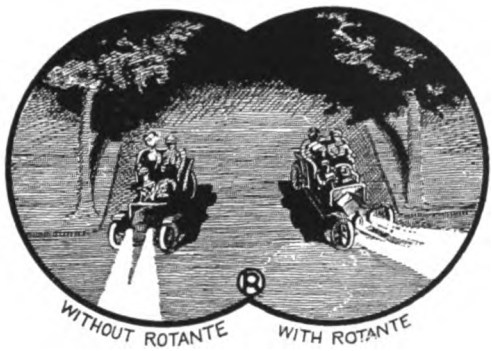
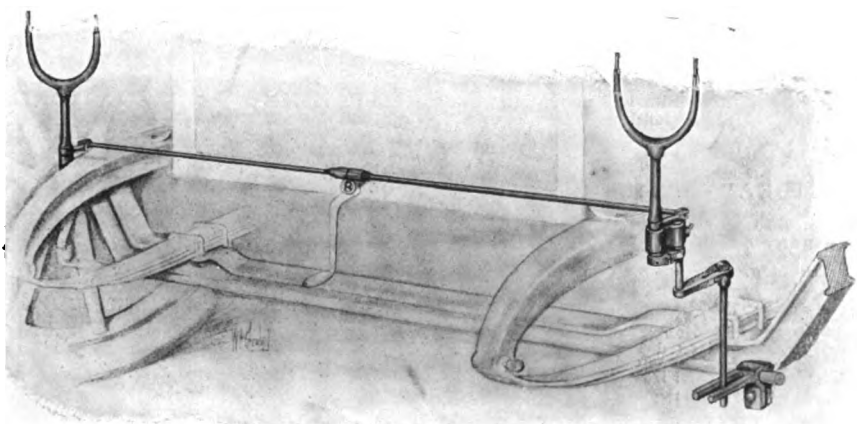
ROTANTE





MODEL A

THIS model of Rotante Brackets is designed for cars that have the steering-rod connected in front of the axle. The Brackets as well as all operating parts are *clamped* to the car, thus allowing for adjustment to any type or make of car, without altering or defacing either. All nuts are self-locking. The only device of its kind on the market.

For further information write

ARTURO G. CERDA

Sole Manufacturer

Head Office:
170 Summer Street

Factory:
19 High Street

BOSTON, MASSACHUSETTS, U. S. A.

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BRACKETS (Continued)

ADJUSTABLE AND AUTOMATIC LAMP BRACKETS (Continued.)

PENDLETON Auto Garage, Westfield, Mass. "McKean."

RHOADS Automobile Headlight Adjuster Co., 721 Minnesota Ave., Kansas City, Kans.

ROCHESTER—See Northway, Thomas J.

ROTANTE—See Cerda, Arturo G.

SCRANTON Automobile Equipment Co., 1438 S. Penn Sq., Philadelphia, Pa.

SHIPLEY—See Automatic Headlight Co.

TROY Carriage Sun Shade Co., Troy, O.

MOTOR CYCLE LAMP BRACKETS

EAST Hampton Bell Co., East Hampton, Conn.

PERFECTION Mfg. Co., 82 N. Fair Oaks Ave., Pasadena, Cal.

WIDMAYER Co., Frank B., 2312 Broadway, New York, N. Y.

SCRANTON Automobile Equipment Co., 1438 S. Penn Sq., Philadelphia, Pa.

STATIONARY LAMP BRACKETS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

B. & B. M'g. Co., 6207 Cedar Ave., Cleveland, O.

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

COX Brass Mfg. Co., Albany, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 227.)

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KNICKERBOCKER Brass Goods Co., 124th St. & First Ave., New York, N. Y.

McCUE Co., Hartford, Conn. (See pages 71 and 291.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

STANHOPE Forge & Machine Works, 27 Stanhope St., Boston, Mass.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

BRAKES

COASTER BRAKES

AURORA Automatic Machinery Co., 1307 Michigan Ave., Chicago, Ill. "Thor."

CORBIN Screw Corp., New Britain, Conn (See page 243.)

ECLIPSE Machine Co., Elmira, N. Y. "Morrow."

MIAMI Cycle & Mfg. Co., Middletown, O. "Musselman."

MORROW—See Eclipse Machine Co.

MUSSELMAN—See Miami Cycle & Mfg. Co.

NEW Departure Mfg. Co., Bristol, Conn.

THOR—See Aurora Automatic Machinery Co.

EXPANDING AND CONTRACTING BRAKES

DUPLEX—See Royal Equipment Co.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 99.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa. (See page 73.)

RAYMOND—See Royal Equipment Co.

ROYAL Equipment Co., 440 Housatonic Ave., Bridgeport, Conn. "Raymond." "Duplex." (See page 103.)

DROP OR SPRAG BRAKES

PERFECT—See Youse & Daddow.

YOUSE & Daddow, 46 N. Fifth St., Reading, Pa. "Perfect."

BRASS

SHEET AND ROD BRASS AND COPPER

(For Tubing—See Tubing, Brass. For Castings—See Castings, Aluminum)

ANSONIA Brass & Copper Co., Ansonia, Conn.

BENEDICT & Burnham Mfg. Co., Waterbury, Conn.

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

BUFFALO Copper & Brass Rolling Mill, Military Road & Hertel Ave., Buffalo, N. Y.

CHASE Rolling Mill Co., Waterbury, Conn.

CHICAGO Brass Co., Kenosha, Wis.

COE Brass Mfg. Co., Torrington, Conn.

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HERE'S THE BEST BRAKE

We've been building brakes almost since the inception of the automobile industry. Our product is famous wherever cars are used. In the

DUPLEX EXTERNAL BRAKES

we have produced brakes of remarkble simplicity. The design is perfect. They act instantly, either *forward or backward.* The DUPLEX is our masterpiece — it possesses the finest material and is absolutely reliable.

SEND US YOUR SPECIFICATIONS

We make brakes to order. We can meet your requirements. Let us estimate on your brake equipment. Write us to day.

HERE'S THE BEST BRAKE LINING

RAYBESTOS is the Standard lining. It is *always* found in the best brakes. Manufacturers of cars mention RAYBESTOS as part equipment because it signifies the best possible equipment.

TRADE MARK **Raybestos**

RAYBESTOS Friction Facing for brakes and clutches can be worked with same tools in machining that are used for cutting metal. Rivet holes may be either punched or drilled and may be countersunk or counter-bored so as to allow the rivet head to stand for some distance entirely below surface of surrounding material. No other brake lining or facing possesses these exceptional features.

RAYBESTOS does not become hard or soft. It works absolutely uniform. Its effectiveness is not impaired as long as there is a particle of material left.

Write us for full information about RAYBESTOS and DUPLEX BRAKES.

THE ROYAL EQUIPMENT COMPANY

440 Housatonic Ave., Bridgeport, Conn.

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BRASS (Continued)

SHEET AND ROD BRASS AND COPPER (Continued)

DETROIT Copper & Brass Rolling Mills. Clark Ave. below Wabash R. R., Detroit, Mich.

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave., W., Detroit, Mich.

NEW Haven Copper Co., Seymour, Conn.

NEW Jersey Tube Co., Newark, N. J. **(See page 649.)**

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome. N. Y.

SCOVILL Mfg. Co., 99 Mill St., Waterbury, Conn.

SEYMOUR Mfg. Co., Seymour, Conn.

TAUNTON-NEW BEDFORD Copper Co., Taunton, Mass.

WATERBURY Brass Co., 26 Crane St., Waterbury, Conn.

BRAZIERS

CAST IRON BRAZIERS

AMERICAN Brazing Co. of Maine, 57 Exchange Pl., Portland, Me.

BRIGGS, A. C., 85 Purchase St., Boston, Mass.

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

FERROFIX Brazing Co. of Conn., Water & Chestnut Sts., New Haven, Conn.

FERROFIX Brazing Co. of Mass., 108 Water St., Boston, Mass.

FERROFIX Brazing Co. of Milwaukee, 251 Lake St., Milwaukee, Wis.

FERROFIX Brazing Co. of Penn., 2930 Penn. Ave., Pittsburg, Pa.

GERLOFF, Chas. W., 300 Water St., Norfolk, Va.

NATIONAL Welding & Mfg. Co., 527 Jackson Blvd., Chicago, Ill.

NEW York Brazing Co., 196 11th Ave., New York, N. Y.

PACIFIC Ferrofix Co., 1008 First Ave., S., Seattle, Wash.

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburgh, Pa.

VULCAN Brazing & Machine Co., 312 N. 16th St., Philadelphia, Pa.

BROADCLOTH

UPHOLSTERY BROADCLOTH

(See also Trimmings, Cloth and Carpet)

COCHECO Woolen Mfg. Co., E. Rochester, N. H.

ROY Woolen Co., Watervliet, N. Y.

SLATER & Sons Woolen Mill, **Webster, Mass.**

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

BROOMS

STEEL WIRE BROOMS

(For cleaning garage floors)

AMERICAN Wire Brush Co., 202-04 Center St., New York, N. Y. "Minerva."

DEAN & Co., Henry E., 180 Austin St., Worcester, Mass.

MINERVA—See American Wire Brush Co.

OSBORN Co., J. M. & L. A., Cleveland, O.

BRUSHES

CARBON MOTOR BRUSHES

AMERICAN Carbon & Battery Co., East St. Louis, Ill.

NATIONAL Carbon Co., Cleveland, O. **(See page 333.)**

SPEER Carbon Co., St. Marys, Pa.

SPARK PLUG BRUSHES

AMERICAN Wire Brush Co., 202-04 Center St., New York, N. Y.

OSBORN Co., J. M. & L. A., Cleveland, O.

PRES Mfg. Co., 6008 Olive St., N. E., Cleveland, O. "Presco."

PRESCO—See Pres Mfg. Co.

BUCKETS

COLLAPSIBLE BUCKETS

ABERCROMBIE & Fitch Co., 57 Reade St., New York, N. Y.

CHANNON Co., H., Market & Randolph Sts., Chicago, Ill.

DUPLEX—See Planet Co.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

PLANET Co., Westfield, Mass. "Duplex."

RUE Mfg. Co., 215 Race St., Philadelphia, Pa.

FIBRE BUCKETS AND PAILS

EASTON Fibre Co., Easton, Pa.

INDURATED Fibre Co., Niagara Falls, N. Y.

VULCANIZED Fibre Co., Wilmington, Del.

METAL BUCKETS AND PAILS

ATLANTIC Stamping Co., Rochester, N. Y.

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L.J.MUTTY CO
BOSTON
15L
REGISTERED TRADE MARK

THIS TRADE MARK GUARANTEES TO YOU

TOP FABRICS OF QUALITY

WE are the acknowledged leaders in MOHAIRS and AUTO FABRICS of every description. It will pay you to write us for our NEW SAMPLE BOOK No. 3 containing new designs for the season of 1911-12. We have ready for immediate shipment our well known and reliable GENUINE MOHAIRS Nos. 15-L, 250-L, and 251-L; also Nos. 20, 60 and 75 in any style or color back. Our assortment of auto fabrics of every description is the largest in the world.

¶ P. S.—SEND FOR OUR NEW RED PRICE LIST CONTAINING REDUCED PRICES TO GO INTO EFFECT OCTOBER 15th.

L. J. MUTTY CO.
BOSTON

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BUCKETS

METAL BUCKETS AND PAILS (Continued)

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

IRON Clad Mfg. Co., 204 Varet St., Brooklyn, N. Y.

NATIONAL Enameling & Stamping Co., 374-78 Broadway, New York, N. Y.

SHEPARD, Sidney, & Co., Buffalo, N. Y.

WHEELING Corrugated Co., Wheeling, W. Va.

WILSON & Co., F. Cortez, 239-41 Lake St., Chicago, Ill.

BUCKLES

STRAP BUCKLES

COWLES & Co., C., New Haven, Conn. (See page 351.)

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

LYNCH Mfg. Co., Madison, Wis. (Lock.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y. (See page 439.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

TURN-BUCKLES

(See Turn-Buckles, Wrought)

BULBS

RUBBER HORN BULBS

CANFIELD Co., H. O., Bridgeport, Conn.

GOODRICH Co., B. F., Akron, O.

HARTFORD Rubber Works Co., Hartford, Conn.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn. (See page 567.)

WALPOLE Rubber Co., Walpole, Mass.

BUMPERS

AUTOMOBILE BUMPERS

(For protecting lamps and radiators)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

AREMCO—See Rothstein Mfg. Co.

ATLAS—See Toffler Co.

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

BECKLEY-RALSTON Co., Michigan Ave. and Randolph St., Chicago, Ill. "McGregor." (See page 159.)

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy." (See page 61.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. "Ross." (See page 351.)

CONOVER—See New Jersey Tube Co.

COX Brass Mfg. Co., Albany, N. Y.

DEFENDER—See Western Brass Mfg Works.

DIAMOND—See Sager Co.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Hercules." "Universal." (See page 283.)

GROSSMAN Co., Emil, 248-50 W. 54th St., New York, N. Y. "Swivelaction."

HALLADAY Co., L. P., 1469 Michigan Blvd., Chicago, Ill.

HANDY—See Chicago Electric Mfg. Co.

HARROUN—See Turner Brass Works.

HERCULES—See Garage Equipment Co.

McGREGOR—See Beckley-Ralston Co.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium." (See page 615.)

NEW Jersey Tube Co., Newark, N. J. "Conover." (See page 649.)

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RADIUM—See Milwaukee Auto Specialty Co.

RANDERSON Auto Parts Co., 108-10 W. 34th St., New York, N. Y. (See page 107.)

ROSS—See Chicago-Racine Aluminum, Brass & Iron Works.

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Diamond."

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SWIVELACTION—See Grossman Co.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y. "Atlas."

TROY Auto Specialty Co., Troy, N. Y. (See page 703.)

TURNER Brass Works, Sycamore, Ill. "Harroun."

UNIVERSAL—See Garage Equipment Mfg. Co.

UNIVERSAL—See Western Brass Mfg Works.

VANGUARD Mfg. Co., Joliet, Ill. (See page 373.)

VASCO—See Victor Auto Supply Mfg. Co.

VICTOR Auto Supply Mfg. Co., 45 W. 43d St., New York, N. Y. "Vasco." (See pages 376 and 377.)

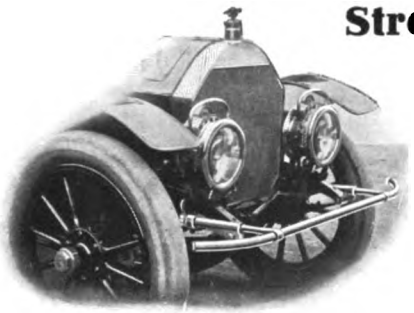
WELTON Automobile Fender Co., 518 Columbus Savings & Trust Bldg., Columbus, O.

Complete Index to Classification appears on Pages 8 to 22.

Digitized by Google

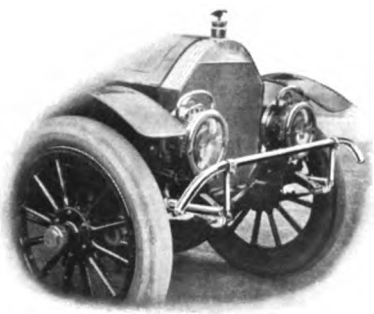
UP or DOWN BUMPER

Strength and Durability



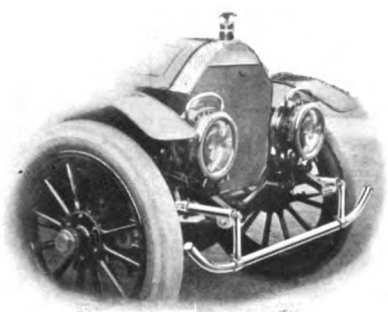
In Service

Absolutely rigid, receives the impact direct and absorbs the shock.



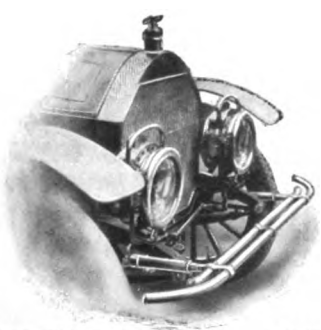
Up

Absolutely rigid, saves space, allows turning in crowded places, and gives access to front of car.



Down

Allows perfect access to front of car for repairing and cranking.



Double Rail

This bumper has all the features of the single rail bumper and is recommended especially for large cars.

RANDERSON AUTO PARTS CO.

108-110 West 24th Street, NEW YORK

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BUMPERS (Continued)

AUTOMOBILE BUMPERS (Continued)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. "Defender," "Universal."
(See page 633.)

RUBBER SPRING BUMPERS

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BRIDGE Web Tire Co., 2962 Prairie Ave., Chicago, Ill.

CANFIELD Co., H. O., Bridgeport, Conn.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Work, 19th & Liberty Sts., Erie, Pa.

DIAMOND Rubber Co., Akron, O.
(See page 139.)

EMPIRE Rubber Mfg. Co., Trenton, N. J.

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

MANSFIELD Rubber Co., Mansfield, O.

MATTSON Rubber Co., Lodi, N. Y.
(See page 431.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MORGAN & Wright, Detroit, Mich.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.
(See page 567.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

WALPOLE Rubber Co., Walpole, Mass.

BUOYS

MOORING BUOYS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

ARMSTRONG Cork Co., Pittsburg, Pa.

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

HADLOCK Bros. Lumber Co., Norfolk, Va.

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

JORDAN Bros., Bank of Commerce Bldg., Norfolk, Va.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

SANDS & Sons Co., A. B., 22-24 Vesey St., New York, N. Y.

WEEKS-HOWE-EMERSON Co., 51 Market St., San Francisco, Cal.

BURNERS

ACETYLENE LAMP BURNERS

ALCO—See American Lava Co.

AMBO—See American Lava Co.

AMERICAN Acetylene Burner Co., Hoosick Falls, N. Y. "Gem," "Pearl," "Shaffer."

AMERICAN Lava Co., Chattanooga, Tenn. "Hela," "Alco," "De Luxe," "No-Name," "Ambo," "Hilo," "Duro," "Hexo."
(See pages 109 and 110.)

BRAY—See Crane Co.

CARROLL, J. B., 217 W. Illinois St., Chicago, Ill. "Columbia," "Hahn."

COLUMBIA—See Carroll, J. B.

CRANE Co., Wm. M., 16-20 W. 32d St., New York, N. Y. "Bray," "Roni."
(See page 111.)

CRESCENT—See Kirchberger & Co.

DE LUXE—See American Lava Co.

DRAKE Acetylene Burner Co., San Jose, Cal.

DURO—See American Lava Co.

GEM—See American Acetylene Burner Co.

HAHN—See Carroll, J. B.

HELA—See American Lava Co.

HEXO—See American Lava Co.

HILO—See American Lava Co.

KIRCHBERGER & Co., 374-80 Second Ave. New York, N. Y. "Crescent," "Von Schwarz."

NO NAME—See American Lava Co.

NOVELTY Burner Co., Box 299, Chattanooga, Tenn. "Queen Eta."
(See page 711.)

PEARL—See American Acetylene Burner Co.

QUEEN ETA—See Novelty Burner Co.

RONI—See Crane Co.

SHAFFER—See American Acetylene Burner Co.

STANDARD Acetylene Burner Co., Tasso, Tenn.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

VON SCHWARZ—See Kirchberger & Co.

GASOLINE AND KEROSENE BURNERS

(For steam boilers)

FORG, Peter, 50 Park St., Somerville, Mass.

KELLY Handle Bar Co., 5017 Perkins Ave., Cleveland, O.

LIGHTNING—See Walker Mfg. Co.

NATIONAL—See Thomson Mfg. Co.

OFELDT & Sons, August, Valley Stream, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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ALCO GERMAN LAVA BURNERS

ALCO BURNERS are made from Genuine German Lava Over "57 Varieties"

ALCO BURNERS will not carbonize—they are the best burners money can buy

AMERICAN LAVA COMPANY
Paul J. Kruesi, Sales Manager
CHATTANOOGA, TENN.

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ALCO GERMAN LAVA BURNERS

Alco De Luxe

Ambo

Alco-Cyco

Alco No17

ALCO Burners Are Made of Genuine German Lava

Alco De Luxe

Mounted in our design patented Hexagon Base De Luxe Pillar. Brass portion or pillar lathe turned from solid hexagon brass rod. Cannot be injured during installation. Standard thread — fits all lamps. Shank of burner threaded and screws into pillar. Cement prevents gas leaking.

Ambo

Best of the brass arm variety of burners. Most symmetrical in design. Elegant nickel finish, which will not tarnish. Tips threaded—screwed into arms instead of depending on a tapered joint. Tips cannot jar loose. Anti-corrosive, heat-resisting cement used in addition to threaded feature which prevents leakage.

Alco Cyco

The Standard burner for motor cycle use This burner is supplied in any length pillar desired. In ¾" pillar, the burner is designated ALCO CYCO. Special length pillars supplied without delay.

Alco No. 17

One of our many miscellaneous styles. We make burners of every shape and style. This style is illustrated, to acquaint you with our preparedness to meet every burner requirement.

Alco No. 12

The largest seller in America You cannot procure a more rigidly tested or reliable burner. Strong, sturdy and built to withstand the most severe usage Be sure to include this burner in your order.

Alco No. 8

A very popular style of slotted burner. The most efficient of all non-turn down burners Yielding highest possible candle power. Especially adapted to withstand variations in gas pressure.

Alco Style 120

The burner portion is the same as in ALCO No. 12 and ALCO CYCO, but is mounted in male fitting, having tapered shank and outside thread.

Alco Hexo No. 12

This burner is greatly in demand for motorcycle use. Supplied in all sizes. Has the design patented hexagon base pillar. A very ornamental and highly efficient burner.

Hilo De Luxe

Illustrated on front page of this insert, is mounted in ou design patented Hexagon Base De Luxe Pillar. Gas can be turned almost out when light is not needed. Saves its cost in gas and carbide almost at once. With the "ordinary" acetylene burner gas must be turned on full, or not at all.

Alco No12

Alco 8

Alco Style 120

Alco HexoNo12

AMERICAN LAVA COMPANY

Paul J. Kruesi, Sales Manager

CHATTANOOGA, TENN.

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The Bray

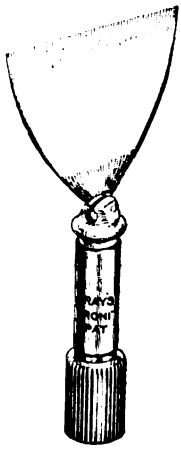
RONI

(One Hole)

Acetylene

Lamp

Burner



No More Cracked Lenses or Reflectors.

No More Troubling With a Cleaning Needle.

No More Smoky Lamps.

ASK FOR THE RONI

SEE THAT SLOT

Burners are being offered to the trade which look like the "Roni." Look out for them—they are not durable. If you want cheap flat-flame burners, we have them as low as $7.50 a gross, but they are not durable. Ask for the "Roni." See that slot.

Samples free to dealers

WILLIAM M. CRANE COMPANY

16-18 and 20 W. 32d Street, NEW YORK

SOLE AGENTS FOR GEO. BRAY & CO., OF LEEDS, ENGLAND

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BURNERS (Continued)

GASOLINE AND KEROSENE BURNERS (Continued)

OFELDT & Sons, F. W., Nyack, N. Y.

SIMMONS, H. C., North Burlington, Vt.

THOMSON Mfg. Co., Judson L., Waltham, Mass. "National."

WALKER Mfg. Co., E. C., Jackson & Lampton Sts., Louisville, Ky. "Lightning."

OIL LAMP AND LANTERN BURNERS

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

WATERBURY Brass Goods Corp., Washington Ave., Waterbury, Conn.

WHEELING Stamping Co., Wheeling, W. Va.

BUTTONS

UPHOLSTERY BUTTONS

ATLAS Tack Co., Fairhaven, Mass.

CINCINNATI Cloth Button Co., 120 Government Pl., Cincinnati, Ohio.

COWLES & Co., C., New Haven, Conn. (See page 351.)

CRANDAL, Stone & Co., Binghamton, N. Y.

HIGGIN Mfg. Co., Newport, Ky. (See page 183.)

JACKSON Cushion Spring Co., Jackson, Mich. (See page 733.)

LOUNSBERY & Sons, G. H., Cincinnati, O. (See page 555.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILONITE—See Morley Mfg. Co.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

NEIDER Co., F. A., Augusta, Ky. (See page 183.)

NEW Haven Button Co., 161 Brewery St., New Haven, Conn.

READE, Chas. W., 103 Court St., New Haven, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TUFTING Machine Supply Co., 1200 Michigan Ave., Chicago, Ill.

WHITE Co. L. C., 214 Bank St., Waterbury, Conn.

CABLE

IGNITION CABLE

(See Wire, Insulated)

WIRE CABLE

(See Rope, Bronze Wire; also Rope, Steel Wire)

CABLES

TOP CABLES

GROSSMAN Co., Emil, 248-50 W. 54th St., New York, N. Y. "Universal."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

UNIVERSAL—See Grossman Co.

CAM-SHAFTS

FINISHED OR MACHINED CAM-SHAFTS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 227.)

HASTINGS Motor Shaft Co., Hastings, Mich.

KRUPP—See Prosser & Son.

MUSKEGON Motor Specialties Co., Water St., Muskegon, Mich. (See page 489.)

OMEGA Separator Co., Lansing, Mich. (See page 605.)

PITTSBURG Shafting Co. of Detroit, Detroit, Mich.

PRECISE Co., New Castle, Ind.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

CANNON

SALUTING CANNON

B & H—See Naval Co.

BARNEY & Berry, Springfield, Mass.

NAVAL Co., 126 Liberty St., New York, N. Y. "B & H."

CANOPIES

AUTOMOBILE CANOPIES

(See Tops, Automobile)

CANS

OILING CANS

(For Oil Guns—See Guns, Oil)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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THE "STAR" ANTI-FRICTION RADIAL AND THRUST "BALL RETAINERS"

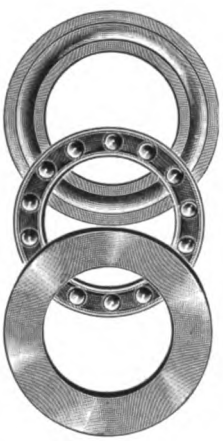
"STAR"

Radial Ball Retainer for Cup and Cone Bearings.

FOR USE IN HUBS, STEERING GEARS, CLUTCHES, TRANSMISSIONS, THRUSTS ON SHAFTS, STEERING KNUCKLES, FANS, MAGNETOS, TIMERS, ETC.

Made in a shop devoted especially to this work by expert workmen and from the best of material.

Our deliveries are prompt. Let us make you quotations and send all details.



"STAR"

Ball Retainer for Thrust Bearings.

THE STAR BALL RETAINER CO., LANCASTER, PA.

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CANS (Continued)

OILING CANS (Continued)

BLOOMER, R. E., Keithsburg, Ill. "Cannon."

BROWN Stamping Co., Dawson St., Toledo, O.

CANNON—See Bloomer, R. E.

CONSOLIDATED Fruit Jar Co., New Brunswick, N. J.

DELPHOS Mfg. Co., Pierce St., Delphos, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HOWLAND—See Maple City Mfg. Co.

KNAPP Mfg. Co., 20 Warren St., New York, N. Y.

McCLINTOCK & Irvine Co., Neville St. & P. R. R., Pittsburg, Pa.

MAPLE City Mfg. Co., Monmouth, Ill. "Howland."

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

NOERA Mfg. Co., Waterbury, Conn. (See page 635.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

VOGEL & Bros., Wm., 37 S. Ninth St., Brooklyn, N. Y.

WALL Mfg. Supply Co., P., 720 Preble Ave., Pittsburg, Pa.

WILSON & Co., F. Cortez, 239-41 Lake St., Chicago, Ill.

WASTE CANS

(Receptacles for oily and dirty waste)

ARROW Can Co., 35 Warren St., New York, N. Y.

ATLANTIC Stamping Co., Rochester, N. Y.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

CENTRAL Stamping Co., 172-74 Fulton St., New York, N. Y.

CLARK Co., W. J., 161 Depot St., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

DELPHOS Mfg. Co., Pierce St., Delphos, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)

DURLACH, I., 54 Vesey St., New York, N. Y.

IRON Clad Mfg. Co., 204 Varet St., Brooklyn, N. Y.

LITTLEFORD Bros., 453-57 E. Pearl St., Cincinnati, O.

McCLINTOCK & Irvine, Neville St. & P. R. R., Pittsburg, Pa.

NACEFAS—See Wilson & Co.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 735.)

ROCHESTER Can Co., 103-09 Hague St., Rochester, N. Y.

WILSON & Co., F. Cortez, 239-41 Lake St., Chicago, Ill. "Nacefas."

CANVAS

CANVAS AND DUCK

ANCHOR Duck Mills, Rome, Ga.

ASHLAND Mfg. Co., Hillsdale, Md.

BOSTON Duck Co., Bondsville, Mass.

BOSTON Yarn Co., 161 Devonshire St., Boston, Mass.

BRIGHTON Mills, Passaic, N. J.

CONSOLIDATED Duck Co., 86 Worth St., New York, N. Y.

FITCHBURG Duck Mills, Fitchburg, Mass.

HALL, Lincoln & Co., 154 Milk St., Boston, Mass.

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

WEST Point Mfg. Co., West Point, Ga.

WILLIAMS Duck Mills, Moodus, Conn

CAPS

HUB CAPS

(Pressed or Stamped Caps. For Cast Caps—See Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y. (See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y. (See page 171.)

CROSBY Co., Buffalo, N. Y. (See page 227.)

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 99.)

HARTFORD Machine Screw Co., Hartford, Conn. (See page 737.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

STOLL Pressed Steel Co., Buffalo, N. Y.

WORCESTER Pressed Steel Co., Barbers Crossing, Worcester, Mass.

MOTORISTS CAPS

ADIRONDACK—See Spear-Martin Fur Co.

BRADLEY Knitting Co., Delevan, Wis.

DEMMERLE & Co., 243 W. 33d St., New York, N. Y.

DETROIT Cap Mfg. Co., 11-17 Woodbridge St., W., Detroit, Mich.

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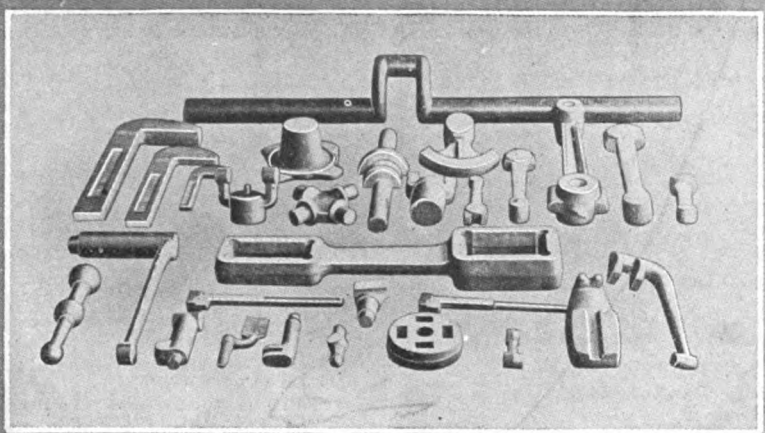
BARNETT DROP FORGING CO.

EAST HAMPTON, MASS.



DROP FORGINGS OF EVERY DESCRIPTION
Special Forgings one of our Features

Highest Quality Materials and Workmanship

Unsurpassed facilities for both light and heavy forgings at
ATTRACTIVE PRICES
Send us your blue prints or models and we will do the rest

ABSOLUTE SATISFACTION GUARANTEED
DELIVERIES ALWAYS PROMPT

Don't hesitate to write to us. We are always pleased to furnish estimates and other information.

One-Piece Drop Forged Axles a Specialty

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CAPS

MOTORISTS CAPS (Continued)

DINNER & Co., I. H., 694 Washington St., Boston, Mass.

FORMAN & Co., Elie, 103 Bedford St., Boston, Mass.

FREEMAN-MAXFIELD Co., 210 E. Madison St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.

HENDRICKS Hat Co., A. P., 127-29 S. Meridian St., Indianapolis, Ind.

KAPLAN, Frank & Dunn, 113-15 University Pl., New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LASKY & Levy, 756-60 Broadway, New York, N. Y.

LEVINE Bros., 105 Bleecker St., New York, N. Y.

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Frères, 19 W. 34th St., New York, N. Y.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St., New York, N. Y.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SPEAR & Co., Woodhaven, N. Y.

WANCKEL, Manfred, 34 E. 21st St., New York, N. Y.

RUBBER RADIATOR CAPS

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

CARBIDE

CALCIUM CARBIDE

ACETYLENE Gas Illuminating Co., 405 Broome St., New York, N. Y. "Candy."

AMERICAN Carbolite Co., 301 S. 55th Ave. W., Duluth, Minn.

CANDY—See Acetylene Gas Illuminating Co.

UNION Carbide Sales Co., 150 Michigan Blvd., Chicago, Ill.

CARBURETERS

GASOLINE CARBURETERS

(For Mixing Valves or Vaporizers—See Vaporizers)

ALCO—See Torrey, Wm. F.

ALLEN Fire Department Supply Co., Providence, R. I.

AMERICAN Die & Tool Co., Reading, Pa. "Weiland."

BALL SPRAY—See Shain, Chas. D.

BARRY IVOR—See Ivor-Turner Mfg. Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."
(See page 159.)

BENNETT—See Wilcox-Bennett Carbureter Co.

BLACK Beauty—See Ivor-Turner Mfg. Co.

BOWERS—See Gilbert Mfg. Co.

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

BREEZE-DETROIT Carbureter Co., 279 Beaufait St., Detroit, Mich.

BUFFALO Carbureter Co., Grand River Ave. & Stanton St., Detroit, Mich.
(See page 409.)

BYRNE, Kingston & Co., 1040 Webster St., Kokomo, Ind. "Kingston."

C. R. G. Mfg. Co., 222 Central St., Saugus, Mass.

CARBURATION Co., 826-30 Champlain Ave., N. W., Cleveland, O. "Gillett."

CARTER Carbureter Co., 920 N. Market St., St. Louis, Mo.
(See page 117.)

CHAPIN Mfg. Co., 850 Massachusetts Ave., Indianapolis, Ind.

COLUMBUS Carburetor Co., 810 Columbus Savings & Trust Bldg., Columbus, O.

COOK & Wilkinson, 121 W. 51st St., New York, N. Y.

D. K. W.—See Duquesne Auto Accessory Co

DALEY, Walter A., 3520 Melrose St., Chicago, Ill.

DEMSTER Machinery Co., 16th & Walnut Sts., Kansas City, Mo.

DETROIT Carbureter Co., 237 Jefferson Ave., E., Detroit, Mich. "E. C. B."

DIEZEMANN—See Stevens Mfg. Co.

DUQUESNE Auto Accessory Co., New Kensington, Pa. "D. K. W."
(See page 757.)

E. C. B.—See Detroit Carbureter Co.

EUREKA—See Variable Power Gas Engine Co.

EXCELSIOR Needle Co., Torrington, Conn.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill. "Rayfield."

FLETCHER & Co., L. V., 42-50 W. 67th St., New York, N. Y.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

G. & A. Carburettor Co., 244-50 W. 49th St., New York, N. Y.
(See page 647.)

GENERATOR Valve Co., 294-96 Taaffe Place, Brooklyn, N. Y.

GILBERT Mfg. Co., New Haven, Conn. "Bowers."

GILLETT—See Carburation Co.

HAGAR Carburettor Co., 819-21 Broadway Nashville, Tenn.

HALLADAY Co., L. P., 1469 Michigan Blvd., Chicago, Ill.

HEITGER Carbureter Co., 205-07 West South St., Indianapolis, Ind.

HOFFNUNG & Co., S., 116 Broad St., New-York, N. Y. (Importers.) "Polyrhoe."

HOLLEY Bros. Co., 661-73 Beaubein St., Detroit, Mich.

HOLTZER-Cabot Electric Co., Boston, Mass.
(See page 413.)

HOYT Carbureter & Automobile Co., 45 Union Ave., Boston, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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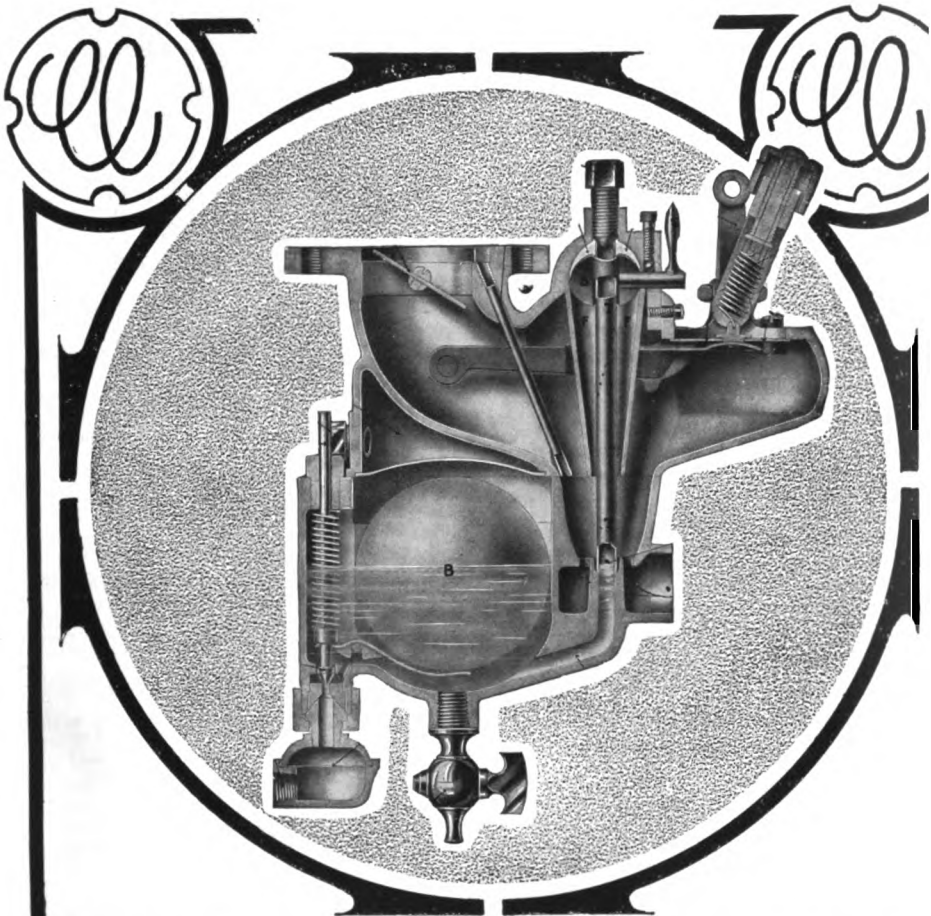

The CARTER CARBURETOR

Every Engineer who has seen the CARTER says it looks good—says the principle is correct. It works better than it looks, however, and we will be glad to demonstrate.

The CARTER differs essentially from all other Carburetors in the following particulars:—

The Vertical Multiple-Jet Fuel Tube.
The Low Vacuum Requirement.
The Anti-Strangling Tube.
The Seamless Copper Ball Float.
The Dash Control of the Auxiliary Air Valve (Model A).

We believe that our new catalogue will interest you and know that a demonstration on your motor will surprise you exceedingly.

Let us show you why Carter Carburetors are better.

The Carter Carburetor Company,

920 NORTH MARKET ST., ST. LOUIS, MO.

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CARBURETERS (Continued)

GASOLINE CARBURETERS (Continued)

HYDRO Carbon Machine Co., 431-33 Bloomfield Ave., Newark, N. J.

IVOR-TURNER Mfg. Co., Barry, 1716 W. Adams St., Chicago, Ill. "Barry Ivor." "Black Beauty."

JERSEY City Auto Machine Works, 312 Chapel Ave., Jersey City, N. J.

KALAMAZOO Carbureter Co., Rose & Water Sts., Kalamazoo, Mich.

KELLY, John, Congress St. & 46th Ave., Chicago, Ill.

KELLY Laboratories, 1456-58 Wabash Ave., Chicago, Ill.

KENNEDY Ideal Carburetor Co., 179 Clarendon St., Boston, Mass.

KINGSTON—See Byrne, Kingston & Co.

KRAUSE, R. E., 1358 Giddings Road, Cleveland, O.

KRICE Carburetor Co., 919 Larned St., E., Detroit, Mich.

LOOMIS Autocar Co., **Westfield, Mass.**

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

MACO—See Motor Appliance Co. of America.

MARVEL Carbureter Co., 2227 Alvord St., Indianapolis, Ind.
(See page 645.)

MAXIMUS—See Beckley-Ralston Co.

MAYER Carbureter Co., 2673 Main St., Buffalo, N. Y.
(See page 645.)

MILLER Carbureter Co., 203 S. Reno St., Los Angeles, Cal.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONARCH Valve Co., 112 Front St., Brooklyn, N. Y.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y.
(See page 323.)

MOTOR Appliance Co. of America, 73 Warren St., New York, N. Y. "Maco."

MULTIPLE Jet Carbureter Co., Dayton, O.

MURPHY-POTTER Co., 366 Trombly St., Detroit, Mich.

NATIONAL Auto Accessory Co., Salem, N. H.

NORTH Chicago Machine Co., North Chicago, Ill. "Palmbla."

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y.
(See page 459.)

PALMBLA—See North Chicago Machine Co.

PALMER-MOORE Co., 230 Tallman St., Syracuse, N. Y.

PLANHARD Mfg. Co., Main & Broadway, Kokomo, Ind.
(See page 119.)

POLYRHOE—See Hoffnung & Co.

RAYFIELD—See Findeisen & Kropf Mfg. Co.

REICHENBACH Laboratories Co., 57-59 E. 24th St., Chicago, Ill. "Vortex."

SCHEBLER—See Wheeler & Schebler.

SCOTT & Sons Co., Fulton & Valley Sts., Medford, Mass.

SHAIN, Chas. D., 1926 Broadway, New York, N. Y. "Ball Spray."
(See page 589.)

SHERWOOD **Mfg. Co., Elmwood Ave. &** Belt Line, **Buffalo, N. Y.**

SIRO Carburetor Mfg. Co., 27-35 Taylor St., Springfield, Mass.
(See page 589.)

STEVENS **Mfg. Co.,** Rome, N. Y. "Diezemann."

STEWARD, A. & J. A., **Rutland, Vt.**

STEWART Machine Works, Alfred C., 1008 Santee St., Los Angeles, Cal.

STROMBERG Motor Devices Co., 64-68 E. 25th St., Chicago, Ill.

STROUD Carburetor Co., 15th St. & Hennepin Ave., Minneapolis, Minn.

TORREY, Wm. F., 384 Atlantic Ave., Boston, Mass. "Alco."

VARIABLE Power Gas Engine Co., 90 West St., New York, N. Y. "Eureka."

VORTEX—See Reichenbach Laboratories Co.

WATERHOUSE Co., 6 Pelham St., Boston, Mass.

WATRES Mfg. Co., 50 Church St., New York, N. Y.

WEILAND—See American Die & Tool Co.

WHEELER & Schebler, **Shelby & Sanders Sts., Indianapolis, Ind. "Schebler."**

WILCOX-BENNETT Carbureter Co., 1030 Marshall Ave., Minneapolis, Minn. "Bennett."

WILLET Engine & Carbureter Co., 764 Ellicott Sq., Buffalo, N. Y.

WILLIAMS Carbureter Mfg. Co., 963 William St., Buffalo, N. Y.

CARPET

COACH CARPET

(See also Trimmings, Cloth and Carpet)

COCHRANE Mfg. Co., **East Dedham, Mass.**

DOBSON, **John & James, 809 Chestnut St., Philadelphia, Pa.**

SCHOFIELD, **Mason & Co., Fairhill, Reese & Cumberland Sts., Philadelphia, Pa.**

CARRIERS

MOTOR CYCLE LUGGAGE CARRIERS

MAJESTIC Mfg. Co., 34 Southbridge St., Worcester, Mass.

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y
(See page 441.)

PATTERSON, A. H., 1080-82 Bedford Ave., Brooklyn, N. Y.

PERFECTION Mfg. Co., 82 N. Fair Oaks Ave., Pasadena, Cal.

STAR Electric Co., 18 N. May St., Chicago, Ill.

SWENSON, B. A., 298 Blackstone St., Providence, R. I.

WIDMAYER Co., Frank B., 2312 Broadway, New York, N. Y.

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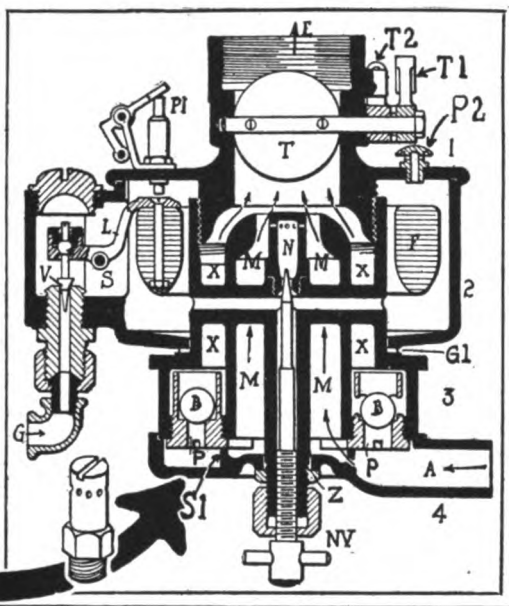
The PLANHARD CARBURETOR

IT'S DIFFERENT

E. Connection to Engine.
T. Throttle.
T1 Throttle Lever.
T2. Throttle Stop.
P1. Flusher.
P2. Umbrella Vent.
F. Float.
S. Pivot for Float Lever.
L. Float Lever.
V. Gasoline Valve.
G. Gasoline Connection.
B. Auxiliary Air Valve.
P. Priming Cup.



A. Warm Air Connection.
N. Atomizer.
M. Constant Air Opening.
X. Auxiliary Air Opening.
Z. Lock Nut.
S1. Ball Retainer Lock.
NV. Adjustable Screw and Packing Nut.
G1. Cop-Asbestos Gasket.
1. Body.
2. Cup.
3. Center.
4. Air Cap.

NOTE ITS UNIQUE CONSTRUCTION

The PLANHARD Carburetor

"IT'S DIFFERENT"

Note Its Unique Construction—Multi-Jet Gasoline Nozzle—Floating-Ball-Type Made of Aluminum or Brass—Concentric Construction

In all the history of carburetor making, there has never been a carburetor, which so perfectly united the gas and the air in a proper combustible mixture. By actual test the cylinders in PLANHARD-equipped motors contain less carbon than when giving equal service with any other carburetor made. If you would avoid motor trouble, keep your motor clean. The PLANHARD speaks for itself. Let us tell you more about it. It has single adjustment—no springs or complications. It is the automatic ideal. Let us send you full details.

PLANHARD MFG. CO., Main and Broadway **Kokomo, Indiana, U. S. A.**

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CARS

MOTOR CYCLE SIDE AND FORE CARS

BRASS City Cycle Works, Waterbury, Conn.

CASES

BATTERY CASES

(See Boxes, Battery)

CARD CASES

(See Cases, Toilet)

CURTAIN CASES

AMERICAN Vulcanized Fibre Co., Equitable Bldg., Wilmington, Del.

MEDICAL EMERGENCY CASES

ACCIDENT Cabinet Co., Kalamazoo, Mich.

BURROUGHS, Wellcome & Co., 35-39 W. 33d St., New York, N. Y. "Tabloid."

SHARP & Smith, 92 Wabash Ave., Chicago, Ill.

TABLOID—See Burroughs, Wellcome & Co.

SPARK COIL CASES

(See Boxes, Spark Coil)

SPARK PLUG CASES

(Leather case for holding spare plugs)

COOK & Bro., E. C., 326-30 Kinzie St., Chicago, Ill.

GORDON—See Vehicle Apron & Hood Co.

HOPEWELL Bros., 29 Chapel St., Newton, Mass.
(See page 767.)

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

TIRE AND TUBE CASES

(For covering spare tires and tubes)

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 121.)

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Clark Bldg., Grand Ave. & Washtenaw St., Lansing, Mich.
(See page 641.)

BROCK—See Vehicle Apron & Hood Co.

COOK & Bro., E. C., 326-30 Kinzie St., Chicago, Ill.

DIAMOND—See Gilbert Mfg. Co.

FALLS City Buggy Top Co., 200 E. Main St., Louisville, Ky.

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

GATES-OSBORNE Mfg. Co., 10 S. Second Ave., Marshalltown, Ia.

GILBERT Mfg. Co., New Haven, Conn. "Diamond," "Star."

GORDON—See Vehicle Apron & Hood Co.

HILLERS—See Hopewell Bros.

HOPEWELL Bros., 29 Chapel St., Newton, Mass. "Kinder," "Hillers," "Russell."
(See page 767.)

KINDER—See Hopewell Bros.

MARSHALLTOWN Buggy Co., Church St. & Third Ave., Marshalltown, Ia.

MERCHANT & Evans Co., 517 Arch St., Philadelphia, Pa. "Star."

MURRAY & Co., P. A., Newton, Mass.

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

OHIO Top Co., 37 Main St., Cincinnati, O.
(See page 659.)

PERFECT—See Wiley & Son Co.

PONTIAC Auto Accessories Co., Osmond Bldg., Pontiac, Mich.

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y.
(See page 441.)

RACINE Buggy Top Co., Racine, Wis.

RUSSELL—See Hopewell Bros.

STAR—See Gilbert Mfg. Co.

STAR—See Merchant & Evans Co.

VEHICLE Apron & Hood Co., Columbus, O. "Brock," "Gordon."

WESTERN Auto Top & Supply Co., 1122-26 E. 15th St., Kansas City, Mo.
(See page 437.)

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn. "Perfect."

WINSHIP, W. W., 71 Summer St., Boston, Mass.

TOILET AND CARD CASES

COWLES & Co., C., New Haven, Conn.
(See page 351.)

ENGLISH & Mersick Co., New Haven, Conn.

KRAFT & Sons, Theo., 534-38 W. Broadway, New York, N. Y.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

PARRY & Co., A. N., Amesbury, Mass.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

PRATZNER, J. V., 61-63 Orange St., New Haven, Conn.

RUMPP & Sons, C. F., Fifth & Cherry Sts., Philadelphia, Pa.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

STRONG, M. H., 168 South Ave., Rochester, N. Y.
(See page 439.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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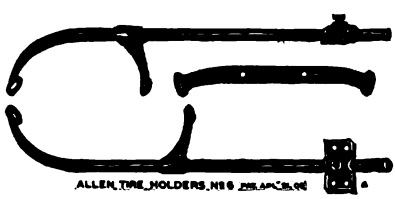
ALLEN
AUTO SPECIALTIES

ALLEN TIRE CASE

Allen Tire Cases are the acknowledged Standard. There is no question as to their superiority. They are made of the finest possible material—the BEST ENAMEL DUCK.
They are built to withstand the most severe usage. They come in all colors and color combinations. They are absolutely necessary and "they button on."

ALLEN Tire Locks and Holders



Allen Tire Locks and Holders are made of highly polished Manganese Bronze—beautifully finished. Also furnished in Malleable Iron. Also Manganese and Iron locks and holders. Numerous styles—large range of prices to suit all cars.

ALLEN TYROMETER
TIRE PRESSURE GAUGE

More damage is done in half an hour to a tire that is not properly inflated than can be counted in 1,000 miles of service.
Allen TYROMETER tells the exact pressure of air in tires. The ALLEN TYROMETER is beautifully finished, constructed of the best material we can buy. It is 4½ inches long, absolutely accurate and fits vest pocket like a fountain-pen. Just press TYROMETER on valve and pressure is immediately shown and held until you release it. Note phantom illustration. See the exquisite workmanship, the fine strong spring, the large readable figures. Price $1.25.

Send for Booklet describing the ALLEN Line

THE ALLEN AUTO SPECIALTY COMPANY
1926 Broadway, New York

Chicago Branch Factory : : : 1436 Michigan Avenue

Minnesota, O. Fenstermacher, Minneapolis.
San Francisco, Cal., Irvin Silverberg & Co., 335 Golden Gate Ave.

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CASES (Continued)

TOOL CASES

(See Bags, Tool; also Boxes, Tool)

CASTINGS

ALUMINUM CASTINGS

A. B. C. Castings Co., Cleveland, O. (See page 125.)

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake."

ADLAKE—See Adams & Westlake Co.

ALLOYS Founding Co., Perry & Illinois Sts., Buffalo, N. Y. (See page 317.)

ALUMINUM Castings Co., Cleveland, O. (See page 129.)

AMERICAN Brass & Aluminum Works, Fulton & E. Walnut Sts., Indianapolis, Ind.

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

AMERICAN Bronze Co., 1415 Niagara St., Buffalo, N. Y.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

AMERICAN Pin Co., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATLAS Brass Foundry Co., 391 S. Front St., Columbus, O.

BAKER, Wm. C., Amesbury, Mass. (See page 687.)

BRIDGEPORT Deoxidized Bronze & Metal Co., Bridgeport, Conn.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill. (See page 567.)

BUCKEYE Brass & Pattern Co., 1807 Columbus Rd., Cleveland, O.

BUNTING Brass & Bronze Co., Toledo, O. (See page 127.)

CARTER, E. T., Plainville, Conn.

CENTAUR Motor Co., Buffalo, N. Y. (See page 514.)

CHAMPION Brass Works, Coldwater, Mich.

CHICAGO-RACINE Aluminum ,Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. (See page 351.)

CITY Brass Foundry Co., Cleveland, O. (See page 683.)

CLUM & Atkinson, Rochester, N. Y. (See page 281.)

CONESTOGA Job & Brass Foundry, 246 N. Christian St., Lancaster, Pa.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Philadelphia, Pa. (See page 281.)

D'ESTE Co., Julian, 24 Canal St., Boston, Mass. (See page 727.)

DORCHESTER Brass & Aluminum Foundry, Jamaica Plain, Boston, Mass.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EXETER Machine Works, Pittston, Pa.

FAIRVIEW Foundry Co., Detroit, Mich.

FLANDERS Mfg. Co., Pontiac, Mich. (See pages 123, 124 and 545.)

FOSTORIA Aluminum Mfg. Co., Fostoria, O.

FRIES & Co., Buffalo, N. Y. (See page 725.)

FRONTIER Engineering Co., 816-36 Fort St., W. Detroit, Mich.

GENERAL Fire Extinguisher Co., Providence, R. I.

GERMANN Bronze Co., Erie, Pa. (See page 133.)

GERSON-CAREY Co., Kalamazoo St. & L. S. Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 651.)

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

INDIANA Auto Parts Co., 33d & Nebraska Sts., Marion, Ind.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

JOHNSON, J. W., Upper Sandusky, O.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

LIGHT Mfg. & Foundry Co., Pottstown, Pa. (See page 691.)

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass. (See page 317.)

LONG Bros., Kokomo, Ind.

LUMEN Bearing Co., Buffalo, N. Y. (See pages 273 and 274.)

McADAMITE—See United States McAdamite Metal Co.

MICHIGAN Aluminum Foundry Co., 124-30 Post Ave., Detroit, Mich.

MILLETT Brass Co., Springfield, Mass. (See page 137.)

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MILWAUKEE Bronze Casting Co., 119 Clinton St., Milwaukee, Wis.

MURPHY-POTTER Co., 366 Trombly St., Detroit, Mich.

NATIONAL Aluminum & Bronze Co., 529-35 Willard St., Indianapolis, Ind.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O.

NORTH & Judd Mfg. Co., New Britain, Conn.

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y. (See page 459.)

ONONDAGA Brass Co., 634-36 Canal St., Syracuse, N. Y. (See page 681.)

PARKER White Metal & Machine Co., Erie, Pa. (See page 317.)

PAULSON & Son, Thos., 95-107 Second Ave., Brooklyn, N. Y. (See page 349.)

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

RACINE Brass & Iron Co., Racine, Wis.

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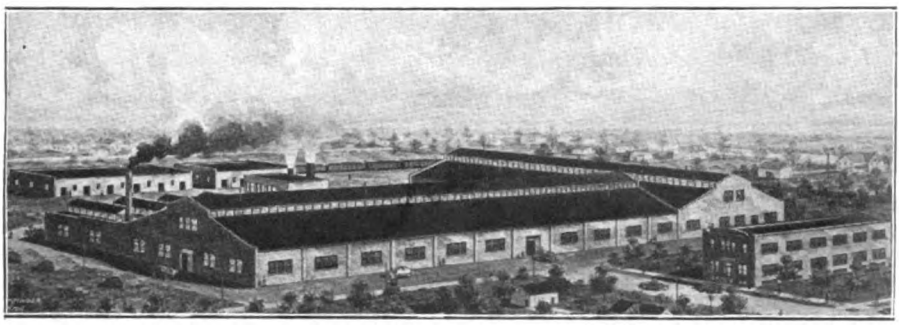
Pontiac Foundry Company

ALUMINUM DEPARTMENT



IT MAY WELL BE SAID that the art—it is nothing less—of casting Aluminum has been developed within the past three or four years. Prior to that time foundries tried to handle this wayward metal as they would gray iron or brass. It wouldn't do.

ALUMINUM IS PERHAPS the most difficult of all metals to handle in a foundry. Its vagaries can be learned only by experience covering a long time and a great variety of forms. It calls for the highest skill of the modern foundryman and the most scientific treatment.

OUR ALUMINUM DEPARTMENT is new. Its equipment is the best money could buy and science dictate. Instead of the old method of melting the metal in crucibles over coke fires we use modern gas furnaces in which we are able to maintain exact temperatures.

INSTEAD OF GUESSING by the color how hot the metal is, we use pyrometers to determine the exact temperature—thereby not only eliminating all chance of burning the metal—and thereby destroying its efficiency—but we are able to make cleaner, stronger, more uniform and handsomer castings than can possibly be made by any other process.

ON CORE WORK WE EXCEL. Being specially equipped for doing the kind of work that is demanded for the best automobile construction we have the latest and best facilities for making, spraying and baking cores. We are therefore able to turn out castings with clean interiors as well as handsome exteriors.

OUR TECHNICAL LABORATORY will be of great help to you in this department as well as in that of brass, bronze and gray iron.

IN SHORT, YOU WILL FIND in the Pontiac Foundry the talent, the experience and the equipment necessary for producing the kind of work you want —that is if you want the best.

FLANDERS MFG. COMPANY

PONTIAC, MICHIGAN

Claire L. Barnes & Company

Direct Factory Representative, Selling Entire Output of Above Company

McCormick Building
193 Michigan Avenue, Chicago

Penobscot Building
Fort Street West, Detroit

Metropolitan Life Building
1 Madison Avenue, New York

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Gray Iron, Aluminum and Bronze Castings; Automobile and Motorcycle Specialists

THIS IS A NEW FOUNDRY especially equipped for making the highest grade—and only the highest grade—of castings for special uses.

THE MEN BACK OF IT are among the foremost manufacturers in those industries. You know who they are—and it goes without saying that they know their business. None better.

THERE HAS BEEN A GREAT NEED for a foundry of ample facilities and modern equipment for making the kind of clean, fine gray iron and other castings that up-to-date engineers demand for fine construction. The Pontiac Foundry Company was organized for the express purpose of filling that need.

YOUR OLD TIME FOUNDRYMAN has proved unequal to the demands of modern engineering—especially in those highly developed branches which include the motor car and the motor cycle. He clings to his old guess-work methods and still protests that your "new fangled ideas" about alloys and foundry practices and heat treatments are foolish.

HE STILL PROTESTS that the way he and his father and his grandfather used to make castings is plenty good enough. You have about decided it's useless to try and educate him—he has too much to forget—and it is too deep seated.

THAT WAS THE WAY we found it—and you have doubtless gone through the same experience. You know what you want—why you want it—and you are anxious to know where you can get what you want when you want it. Answer is Pontiac Foundry Company.

OUR EQUIPMENT is up to the minute. First in importance is a technical laboratory second to none in this country, where every piece of pig is analyzed—where qualities of different alloys are determined and castings tested by the most rigid methods.

INSTEAD OF GUESSING by the color how hot the metal is, we use pyrometers which register degrees of heat absolutely. Then our foundry is new and every piece of equipment is up to the minute. In short, we have built and equipped an ideal plant for doing the class of work you want done.

WE WILL ACCEPT small, or experimental orders—but our specialty is quantity orders with quality specified as the first requisite.

Automobile cylinder castings—from small singles to the most difficult sixes "en bloc" are standard with us—so extensive has been the experience of our foundry experts. Let's talk over your blue prints together.

FLANDERS MFG. COMPANY

PONTIAC, MICHIGAN

Claire L. Barnes & Company

Direct Factory Representative, Selling Entire Output of Above Company

McCormick Building
193 Michigan Avenue, Chicago

Penobscot Building
Fort Street West, Detroit

Metropolitan Life Building
1 Madison Avenue, New York

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ALUMINUM
BRONZE COPPER
A B C
CASTINGS

The
A.B.C. Castings
Company
Cleveland

THE EMBODIMENT OF ALL THAT IS
REQUISITE AND DESIRABLE IN
Perfect Castings
Uniform weights Perfect corework
Highest Tensile Strength
and besides all this
Absolute Deliveries

Aerial Metal lighter and stronger than Aluminum.
For High Speed Engines *Meteor Babbitt Metal*

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CASTINGS (Continued)

ALUMINUM CASTINGS (Continued)

REEVES & Son, Paul S., 1415-25 Catherine St., Philadelphia, Pa.

RIVERVIEW Bronze & Mfg. Co., 18-30 Gull St., Buffalo, N. Y.

SAYRE Stamping Co., Sayre, Pa.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

STANDARD Brass Foundry Co., 6522-32 Central Ave., S. E., Cleveland, O.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER Brass Works, Sycamore, Ill.

U. S. Bronze Co., 1831 Columbus Rd., Cleveland, O.

UNITED States Aluminum Castings Co., 1623 Bluerock St., Cincinnati, O.

UNITED States McAdamite Metal Co., 18-28 Rapelye St., Brooklyn, N. Y. "McAdamite."

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis. (See page 585.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

WESTERN Motor Co., Marion, Ind. (See page 295.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WILLIAMS & Son, E. A., 105 Plymouth St., Jersey City, N. J.

BRONZE AND BRASS CASTINGS

A. B. C. Castings Co., Cleveland, O. (See page 125.)

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake."

ADLAKE—See Adams & Westlake Co.

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALLOYS Founding Co., Perry & Illinois Sts., Buffalo, N. Y. (See page 317.)

ALUMINUM Castings Co., Cleveland, O. (See page 129.)

AMERICAN Brass & Aluminum Works, Fulton & E. Walnut Sts., Indianapolis, Ind.

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

AMERICAN Bronze Co., Berwyn, Pa. (See page opposite inside front cover.)

AMERICAN Bronze Co., 1415 Niagara St., Buffalo, N. Y.

AMERICAN Car & Ship Hardware Mfg. Co., New Castle, Pa.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

AMERICAN Manganese Bronze Co. (Holmesburg), Philadelphia, Pa.

AMERICAN Pin Co., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATLAS Brass Foundry, 155 A St., Boston, Mass.

ATLAS Brass Foundry Co., 991 S. Front St., Columbus, O.

ATTWOOD Brass Works, Court St., Grand Rapids Mich. (See page 351.)

BAKER, Wm. C., Amesbury, Mass. (See page 687.)

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BRAINERD Mfg. Co. (E. Rochester), Rochester, N. Y.

BRIDGEPORT Deoxidized Bronze & Metal Co., Bridgeport, Conn.

BRIDGEPORT Foundry & Machine Co., Washburn & Carbon Sts., Bridgeport, Conn.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill. (See page 567.)

BUCKEYE Brass & Pattern Co., 1807 Columbus Rd., Cleveland, O.

BUFFALO Brass Foundry Co., 12 Perry St., Buffalo, N. Y.

BUNTING Brass & Bronze Co., Toledo, O. (See page 127.)

CARTER, E. T., Plainville, Conn.

CENTAUR Motor Co., Buffalo, N. Y. (See page 514.)

CENTRAL Brass Foundry, 105-07 S. Clinton St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHALLINGE Brass Co., 501 Quinnipiac Ave., New Haven, Conn.

CHAMPION Brass Works, Coldwater, Mich.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. (See page 351.)

CITY Brass Foundry Co., Cleveland, O. (See page 683.)

CLUM & Atkinson, Rochester, N. Y. (See page 281.)

COLONIAL Brass Co., 112 Park St., New Haven, Conn.

CONESTOGA Job & Brass Foundry, 246 N. Christian St., Lancaster, Pa.

CONSOLIDATED Casting Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Philadelphia, Pa. (See page 281.)

DELTA—See Phosphor Bronze Smelting Co.

D'ESTE Co., Julian, 24 Canal St., Boston, Mass. (See page 727.)

DETROIT Motor Casting Co., 290-303 Beaufait Ave., Detroit, Mich.

DONOVAN Foundry Co., 249 R. R. Ave., Bridgeport, Conn.

DORCHESTER Brass & Aluminum Foundry, (Jamaica Plain), Boston, Mass.

ELEPHANT—See Phosphor Bronze Smelting Co.

ELKHART Brass Mfg. Co., 916 Prospect St., Elkhart, Ind.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo.

EUREKA Tempered Copper Works, North-East, Pa.

EXETER Machine Works, Pittston, Pa.

FAIRVIEW Foundry Co., Detroit, Mich.

FALLON Brass Foundry, S. Lawrence, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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THE above cut shows a number of duplicate brass parts finished complete, ready for assembling, which we are manufacturing in quantities of from 100 to 100,000 each.

Our material will enter into the manufacture of a little over 60 per cent of the cars which will be built during the 1911 season.

In each case it was necessary for us to demonstrate our ability to produce this work at a cost below that of the car or parts-builders using it.

Material and workmanship guaranteed.

Send blue-prints or samples for quotations.

Punting Brass and Bronze Co

Toledo Ohio

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

FLANDERS Mfg Co., Pontiac, Mich. (See pages 123, 124 and 545.)

FOREST City Brass Works, Cleveland, O.

FORT Hill Bronze Co., 48-56 Waters Ave., West Everett, Mass.

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

FRANKLIN Brass Foundry Co., William H., Merrimac, Mass.

FRIES & Co., Buffalo, N. Y. (See page 725.)

FRONTIER Engineering Co., 816-36 Fort St., W. Detroit, Mich.

GAYLORD Co., F. L., Ansonia, Conn.

GENERAL Fire Extinguisher Co., Providence, R. I.

GERMANN Bronze Co., Erie, Pa. (See page 133.)

GERSON-CAREY Co., Kalamazoo St. & L. S. Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 651.)

GRIFFOUL & Bros., A., 280-86 Chestnut St., Newark, N. J.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

IDEAL Bronze Co., 1255 E. 55th St., Cleveland, O.

IDEAL Mfg. Co., 570 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

INDIANA Auto Parts Co., 33d & Nebraska Sts., Marion, Ind.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

JOHNSON, J. W., Upper Sandusky, O.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KELLS Foundry & Machine Co., E. Gary, Ind.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KOKOMO Brass Works, 1040 Webster St., Kokomo, Ind.

LANGSENKAMP-WHEELER Brass Works, 1206-28 Shelby St., Indianapolis, Ind.

LIGHT Mfg. & Foundry Co., Pottstown, Pa. (See page 691.)

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass. (See page 317.)

LONG Bros., Kokomo, Ind.

LUMEN Bearing Co., Buffalo, N. Y. (See pages 273 and 274.)

LUNDHAVEN Brass Foundry Co., 41-45 Leitchworth St., Buffalo, N. Y.

MILLETT Brass Co., Springfield, Mass. (See page 137.)

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MILWAUKEE Bronze Casting Co., 119 Clinton St., Milwaukee, Wis.

MURPHY-POTTER Co., 366 Trombly St., Detroit, Mich.

MILWAUKEE Valve Co., 871-81 Robinson Ave., Milwaukee, Wis.

MUELLER Metal Co., 288 Dyer St., Providence, R. I.

NATIONAL Aluminum & Bronze Co., 529-35 Willard St., Indianapolis, Ind.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O.

NORTH & Judd Mfg. Co., New Britain, Conn.

NORWALK Brass Co., Mechanic St., Norwalk, Conn.

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y. (See page 459.)

ONONDAGA Brass Co., 634-36 Canal St., Syracuse, N. Y. (See page 681.)

PARKER White Metal & Machine Co., Erie, Pa. (See page 317.)

PAULSON & Son, Thos., 95-107 Second Ave., Brooklyn, N. Y. (See page 349.)

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant," "Delta." (See page 543.)

PITTSBURG Brass Mfg. Co., 32d St. & Penn Ave., Pittsburg, Pa.

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

REEVES & Son, Paul S., 1415-25 Catherine St., Philadelphia, Pa.

RIDER-BAGG Co., Birnie Ave., Springfield, Mass.

RIVERVIEW Bronze & Mfg. Co., 18-30 Gull St., Buffalo, N. Y.

SAYRE Stamping Co., Sayre, Pa.

SCIOTO Brass Foundry, 10 S. Scioto St., Columbus, O.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SPENCER'S Sons, I. S., Guilford, Conn.

SPRINGFIELD Brass Co., 126-30 S. Limestone St., Springfield, O.

STANDARD Brass Foundry Co., 6522-32 Central Ave., S. E., Cleveland, O.

STANDARD Bronze & Brass Co., 187 W. Broad St., Columbus, O.

STANDARD Foundry Co., Hartford, Conn.

THIERY & Kendrick Mfg. Co., 660-64 Franklin St., Detroit, Mich.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER Brass Works, Sycamore, Ill.

UNIQUE Brass Foundry Co., 25 Illinois St., Buffalo, N. Y.

U. S. Bronze Co., 1831 Columbus Rd., Cleveland, O.

VANADIUM Metals Co., Frick Bldg., Pittsburg, Pa. "Victor." (See page 407.)

VICTOR—See Vanadium Metals Co.

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Highest

ALLYNE ALLOYS

Quality

¶ We set a high standard to work to, and are able to maintain that standard by daily physical and chemical tests and by a rigid inspection of all castings before shipment. Our castings therefore are of a much higher and more uniform quality than possible to produce under the old order of foundry practice, and although the cost of such a thorough system is prohibitive when set up against a small production, it adds but a small amount to the cost of our castings on account of the large volume of our business.

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DETROIT BUFFALO
SYRACUSE
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MANITOWOC, WIS.

THE ALUMINUM CASTINGS COMPANY

Aluminum, Brass and Bronze Castings

General Offices: Cleveland, Ohio.

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis.
(See page 585.)

WATERBURY Mfg. Co., Waterbury, Conn.

WESTERN Brass Mfg. Works 2512-22 W. 21st St., Chicago Ill.
(See page 633.)

WESTERN Motor Co., Marion, Ind.
(See page 295.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

WILLIAMS & Son, E. A., 105 Plymouth St., Jersey City, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

DIE CASTINGS

AMERICAN Die Casting Co., Vandalia Tracks & White River, Indianapolis, Ind.
(See page 317.)

BLISS Co., E. W., Brooklyn, N. Y.

DOEHLER Die Casting Co., Court & Ninth Sts., Brooklyn, N. Y.
(See page 135.)

FORT Hill Bronze Co., 48-56 Waters Ave., West Everett, Mass.

FRANKLIN Mfg. Co., H. H.., Syracuse, N. Y.

GERMANN Bronze Co., Erie, Pa.
(See page 133.)

HOYT Metal Co., Merchants-LaClede Bldg., St. Louis, Mo.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 691.)

LUMEN Bearing Co., Buffalo, N. Y.
(See pages 273 and 274.)

MOBERG, C. J., Mt. Vernon, N. Y.

MODEL Die & Tool Co., Penn Ave. & Georgia St., Indianapolis, Ind.

MOGUL Metal Co., Detroit, Mich.
(See page 681.)

MUZZY-LYON Co., Detroit, Mich.
(See page 681.)

NATIONAL Lead Co., 111 Broadway, New York, N. Y.
(See page 551.)

PARKER White Metal & Machine Co., Erie, Pa.
(See page 317.)

PHOENIX Die Casting Co., 21 Illinois St., Buffalo, N. Y.
(See page 543.)

PRECISION Die-Casting Co., 420 S. West St., Syracuse, N. Y.
(See page 621.)

PRECISION Mfg. Co., 402-04 S. Franklin St., Syracuse, N. Y.

PACKE Machine Co., F. W., Indianapolis, Ind.
(See page 313.)

STROH Die Moulded Casting Co., 163-73 Michigan St., Milwaukee, Wis.

SYRACUSE Die Moulded Casting Co., Syracuse, N. Y.

SYRACUSE Smelting Works, 149-51 Jewell St., Brooklyn, N. Y.

VAN Wagner Mfg. Co., E. B., 702 Union Bldg., Syracuse, N. Y.
(See pages 131 and 132.)

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

WETHERILL Finished Castings Co., Philadelphia, Pa.

WHITE Brass Casting Co., 1656 Austin Ave., Chicago, Ill.

WHITE Metal & Machine Co., Erie, Pa.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

ZENITE Metal Co., 123 W. Maryland St. Indianapolis, Ind.

GRAY IRON CASTINGS

ACME Foundry Co., Detroit, Mich.

ADRIAN Steel Casting Co., Adrian, Mich.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

AMERICAN Motor Castings Co., Fordyce & Marston Aves., Detroit, Mich.

ARNOLD Co., Norwalk, Conn.

BARCUS & Co., Geo., Wabash, Ind.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BOSTON Foundry Co., 12 Pearl St., Boston, Mass.

BRIDGEPORT Malleable Iron Co., 719 South Ave., Bridgeport, Conn.

CAPITOL Foundry Co., Hartford, Conn.

CENTRAL Machine & Foundry Co., 15th St. & Virginia Ave., Marion, Ind.

CHICAGO Hardware Foundry Co., North Chicago, Ill.

COLUMBIA Gray Iron Co., Second & Linden Sts., Columbia, Pa.

CONSOLIDATED Castings Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Philadelphia, Pa.
(See page 281.)

DEAN Mfg. Co., 262 Front St., Newport, Ky.

DETROIT Foundry Co., N. Grand Blvd. & Riopelle St., Detroit, Mich.

DREISBACH Foundry & Machine Co., C. A., 25 Poplar St., New Haven, Conn.

ELEVATOR Supply & Repair Co., 561 W. Monroe St., Chicago, Ill.

EMPIRE Foundry Co., Jersey Ave., New Brunswick, N. J.

EMPIRE Foundry Co., 203 Temple St., Syracuse, N. Y.

ENTERPRISE Foundry Co., 1127-57 E. Warren Ave., Detroit, Mich.

ERIE Foundry Co., 12th & Cranberry Sts., Erie, Pa.

FAIRBANKS Co., Springfield, O.
(See page 519.)

FAIRVIEW Foundry Co., Detroit, Mich.

FANNER Mfg. Co., Cleveland, O.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 581 and 584.)

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FLATHER Foundry Co., Nashua, N. H.

FRONTIER Iron Works, Buffalo, N. Y.

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

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VAN WAGNER DIE CASTINGS

Are made in a modern factory equipped alone for this work, back of which is thirty years' experience of practical men.

Van Wagner Die Castings are made true to your drawings to within .0001 of an inch. Through a system of a very accurate weighing, the solidity standard of a Van Wagner Die Casting is absolutely maintained. This makes it easy to guarantee that Van Wagner Die Castings are absolutely free from "blow holes" and other mechanical imperfections.

If you are now using, or if you intend to use, parts ordinarily made of brass, bronze or iron that require machine work, send us drawings or samples and let us submit prices on finished white metal castings.

Remember that we make finished white metal castings exclusively—we employ only the highest grade of skilled labor, and all alloys are made in our own factory from the best of raw material.

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General Offices: McCormick Building, CHICAGO

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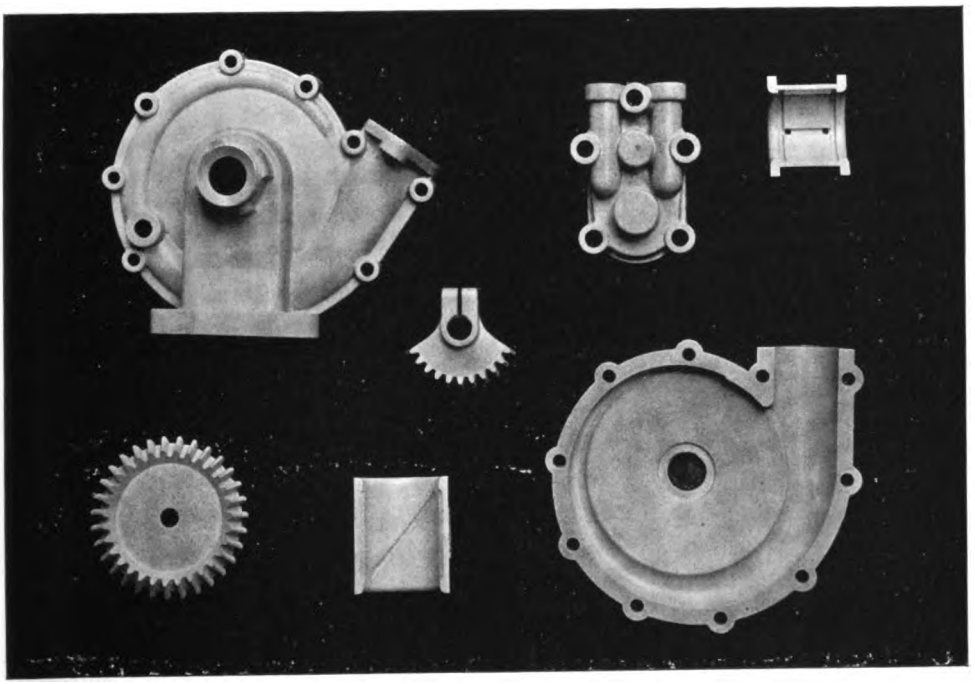

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Our Castings are the Dependable Kind

Edkin Metal Brake Lining

Costs more than any other kind, and is used on only the very best cars.

Wise car buyers will discriminate.

Sample on Request

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ERIE, PENNA.

Detroit Sales Office:

W. T. CULLEN, Mgr., 200 Majestic Bldg., Detroit, Mich.

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CASTINGS (Continued)

GRAY IRON CASTINGS (Continued)

GENERAL Foundry & Machine Co., Belden Ave. & Sand St., Syracuse, N. Y.

GREY Iron Castings Co., Mt. Joy, Pa.

GRIFFOUL & Bros., A., 280-86 Chestnut St., Newark, N. J.

HALL Gas Engine Mfg. Co., Byesville, O.

HART Foundry Co., 10 Allen St., Lawrence, Mass.

HILDRETH Mfg. Co., 703 Sheridan St., Lansing, Mich.

HILLES & Jones Co., Wilmington, Del.

HOLBROOK ARMSTRONG Iron Co., 16th St. & Junction Ave., Racine, Wis. (See page 585.)

HOLYOKE Motor Foundry Co., Holyoke, Mass.

HOPSON & Chapin Mfg. Co., New London, Conn.

HUPP-JAMES-HALLORAN Foundry Co., Ft. of Lycaste St., Detroit, Mich.

INDIANAPOLIS Foundry Co., 181 S. Harding St., Indianapolis, Ind.

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) (See pages 613 and 709.)

INTERSTATE Foundry Co., E. 61st St. & Erie R. R., Cleveland, O.

JOHNSON, J. W., Upper Sandusky, O.

KELLY Foundry Co., Edward, 2000 S. Main St., Elkhart, Ind.

KELLS Foundry & Machine Co., E. Gary, Ind.

LOVEWELL-HENRICI Co., 928 Broadway, Chelsea, Mass.

LUSK Bros. Foundry Co., 209-15 Van Buren St., Jackson, Mich.

LYCOMING Foundry & Machine Co., Williamsport, Pa.

McFARLAND Foundry & Machine Co., Trenton, N. J.

MANUFACTURERS Foundry Co., Waterbury, Conn. (See page 173.)

MARION Machine, Foundry & Supply Co., Third St. & Big Four Railway, Marion, Ind.

MIAMI Foundry Co., Hamilton, O.

MICHIGAN Motor Castings Co., Detroit, Mich.

MOHN & Kershner, Green St., Reading, Pa.

MUNCIE Foundry & Machine Co., Muncie, Ind. (See page 675.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NORTH & Judd Mfg. Co., New Britain, Conn.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis. (See page 419.)

PALMER & De Mooy Foundry Co., Leonard & Winter Sts., Cleveland, O.

PEERLESS Foundry Co., Hamilton, O.

PEQUONNOCK Foundry, Bridgeport, Conn.

PORTLAND Foundry & Machine Co., Portland, Ind.

PRATT Foundry Co., Campello, Mass. (See page 605.)

RACINE Brass & Iron Co., Racine, Wis.

RACINE Foundry Co., Tenth St. & C., M. & St. P. Ry., Racine, Wis.

REEDY Foundry Co., 4600 Iowa St., Chicago, Ill.

RELIANCE Iron & Engine Co., West & Geneva Sts., Racine, Wis.

SEAGER Engine Works, Lansing, Mich. (See page 289.)

SMITH Mfg. Co., Philip, Sidney, O.

SOWERS Mfg. Co., Buffalo, N. Y.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Foundry Co., Forest & Kewaunee Sts., Racine, Wis.

STANDARD Foundry & Mfg. Co., 2717 E 75th St., Cleveland, O.

STOWELL Mfg. & Foundry Co., So. Milwaukee, Wis.

SUSQUEHANNA Casting Co., Wrightsville, Pa.

THREE Rivers Furnace & Foundry Co., Three Rivers, Mich.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNION Mfg. Co., New Britain, Conn.

URICK Foundry Co., Erie, Pa.

UTICA Steam Engine & Boiler Co., 272 Whitesboro St., Utica, N. Y.

VICTOR Iron Works Co., 521 Schofield Bldg., Cleveland, O.

WALKER Foundry Co., Erie, Pa.

WATERBURY Castings Co., R. R. Hill, Waterbury, Conn.

WAYNE Works, Richmond, Ind.

WEST Side Foundry Co., Troy, N. Y.

WESTERN Foundry Co., 3634 S. Kedzie Ave., Chicago, Ill.

WESTERN Motor Co., Marion, Ind. (See page 295.)

MALLEABLE IRON CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ALBION Malleable Casting Co., Albion, Mich.

ARCADE Malleable Iron Co., Worcester, Mass.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BELLE City Malleable Iron Co., Racine, Wis.

BRIDGEPORT Malleable Iron Co., 719 South Ave., Bridgeport, Conn.

BUHL Malleable Iron Co., Detroit, Mich.

CHISHOLM & Moore Mfg. Co., Lakeside Ave. & E. 49th St., Cleveland, O.

COLUMBUS Malleable Casting Co., 770 Jefferson Pl., Columbus, O.

DAYTON Malleable Iron Co., Dayton, O.

ERIE Malleable Iron Co., Cherry St., & E. P. R. R., Erie, Pa.

FANNER Mfg. Co., Cleveland, O.

FLAGG & Co., Stanley G., Philadelphia, Pa.

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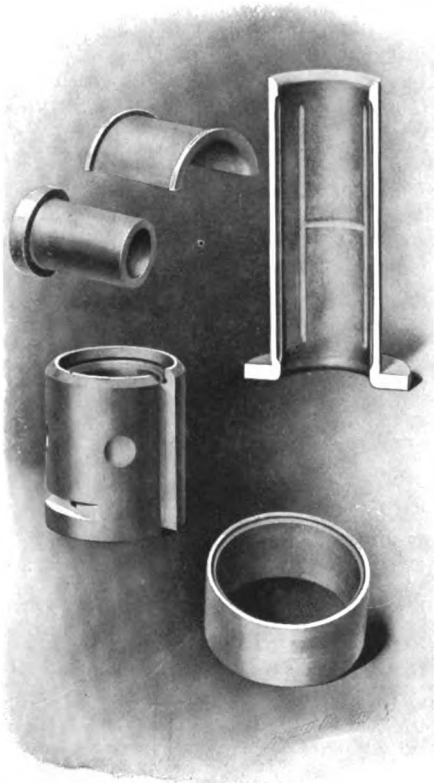

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ACCURATE in dimensions

PERFECT in finish

BEST in service

Our new plant has tripled our output. This season we can take care of your contract with deliveries guaranteed. Send for samples and booklet.

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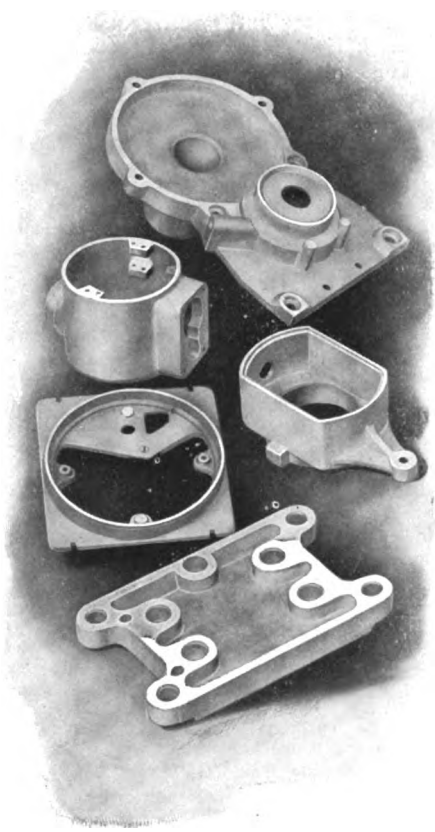
FOR

MAGNETOS, TIMERS, CARBURETERS, OIL and **WATER PUMPS, SPEEDOMETERS,** and other Automobile Accessories.

Production of DIE CASTINGS is our business and our hobby. We are not Sales AGENTS, but MANUFACTURERS and SPECIALISTS in the ART OF DIE-CASTING. Our EXPERIENCE is your guarantee for satisfaction. Send for Catalogue T and keep posted on the latest and best in up-to-date methods.



DOEHLER DIE CASTING CO.

Court and Ninth Streets
BROOKLYN, N. Y.

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CASTINGS (Continued)

MALLEABLE IRON CASTINGS (Continued)

FRAZER & Jones Co., Syracuse, N. Y.

GENERAL Foundry & Machine Co.,, Belden Ave. & Sand St., Syracuse, N. Y.

GLOBE Malleable Iron & Steel Co., Greenway Ave., Syracuse, N. Y.

ILLINOIS Malleable Iron Co., 1801-25 Diversey Blvd., Chicago, Ill.

JEWEL Steel & Malleable Co., Military Rd. & Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 349.)

MEEKER Foundry Co., 95 Clay St., Newark, N. J.

MOLINE Malleable Iron Co., St. Charles, Ill.

NATIONAL Malleable Castings Co., Chicago, Ill.

NAUGATUCK Malleable Iron Co., Naugatuck, Conn.

NORTH & Judd Mfg. Co., New Britain, Conn.

OHIO Malleable Iron Co., Columbus, O.
(See page 695.)

ORISKANY Malleable Iron Co., Oriskany, N. Y.

PRATT Mfg. Co., Wm. E., 91 Lake St., Chicago, Ill.

PRATT & Letchworth, 189 Tonawanda St., Buffalo, N. Y.

RHODE Island Malleable Iron Works, Hills Grove, R. I.

SOUTH Side Malleable Casting Co., Windlake & 14th Aves., Milwaukee, Wis.

STOWELL Mfg. & Foundry Co., S. Milwaukee, Wis.

STRAIGHT Line Engine Co., Syracuse, N. Y.

SYRACUSE Malleable Iron Works, Syracuse, N. Y.
(See page 603.)

TERRE Haute Malleable & Mfg. Co., N. 19th St., Terre Haute, Ind.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

UNITED States Malleable Iron Co., Woodville St., Toledo, O.

WILMINGTON Malleable Iron Co., Wilmington, Del.

STEEL CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ADRIAN Steel Casting Co., Adrian, Mich.

BETHLEHEM Steel Co., So. Bethlehem, Pa.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BUFFALO Crucible Casting Co., 25 Washington St., Buffalo, N. Y.

BUHL Malleable Iron Co., Detroit, Mich.

CARPENTER Steel Co., Reading, Pa.

CHESTER Steel Castings Co., Chester, Pa.

CHICAGO Steel Foundry Co., 19th & Rockwell Sts., Chicago, Ill.

CRUCIBLE Steel Casting Co., Lansdowne, Pa.

CRUCIBLE Steel Castings Co., 612 Clinton St., Milwaukee, Wis.

DAMASCUS Crucible Steel Casting Co., New Brighton, Pa.

DAYTON Steel Foundry Co., Dayton, O.

EASTERN Steel Castings Co., 696 E. First St., S. Boston, Mass.

FARRELL-CHEEK Steel Foundry Co., Sandusky, O.
(See page 675.)

FLAGG & Co., Stanley G., Philadelphia, Pa.

FORT Pitt Steel Casting Co., McKeesport, Pa.

GERLINGER Steel Casting Co., 59th St. & National Ave., W. Allis, Wis.

HYDE Park Steel Casting Co., Hyde Park, Mass.

INLAND Steel Casting Co., Terre Haute, Ind.
(See page 349.)

JEWEL Steel & Malleable Co., Military Rd. & Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

KEYSTONE Steel Casting Co., Chester, Pa.

KRUPP—See Prosser & Son.

LEBANON Steel Casting Co., Lebanon, Pa.

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.
(See page 317.)

LUNDIN Steel Castings Co., Neponset, Mass.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 349.)

MAYNARD Steel Foundry Co., 710-16 Reed St., Milwaukee, Wis.

MICHIGAN Steel Casting Co., 248-50 Gratiot St., Detroit, Mich.

MILBURY Steel Foundry Co., Milbury, Mass.

MILWAUKEE Steel Foundry Co., S. Water & Virginia Sts., Milwaukee, Wis.

NEW Jersey Steel Co., Rahway, N. J.

NEW Process Steel Co., Marshall, Mich.
(See page 349.)

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.
(See page 419.)

OOSTBURG Steel Foundry, Oostburg, Wis.

PRATT & Letchworth, 189 Tonawanda St., Buffalo, N. Y.

PRIME Steel Co., Milwaukee, Wis.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

RACINE Steel Castings Co., Racine, Wis.

REED Mfg. Co., Kalamazoo, Mich.
(See page 609.)

RIVERSIDE Steel Casting Co., 451-73 Riverside Ave., Newark, N. J.

SMITH Steel Castings Co., Geo. H., 500 Clinton St., Milwaukee, Wis.

STRONG Steel Foundry Co., Main & Amherst Sts., Buffalo, N. Y.

TAYLOR Iron & Steel Co., High Bridge, N. J.

UNION Steel Casting Co., Boston, Mass.

WEST Steel Casting Co., Cleveland, O.

WHITELEY Steel Co., 103½ Jefferson St., Muncie, Ind.

WITTEMAN Co., A. P., 112-16 N. Broad St., Philadelphia, Pa.
(See page 489.)

Complete Index to Classification appears on Pages 8 to 22.

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MILLETT

BRASS CO.

SPRINGFIELD, MASS.

MAKERS OF

ALUMINUM BRASS AND BRONZE CASTINGS

MAXIMUM QUALITY AT MINIMUM COST

It is beyond the power of any firm to offer bigger inducements to secure your business. We have ample facilities to meet every possible requirement and simply ask you to give us the opportunity to prove the truth of every claim.

SEND US YOUR PATTERNS OR BLUE PRINTS
and let us make you up a sample order.

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CATCHES

SPRING CABINET CATCHES AND FASTENERS

BRASS Goods Mfg. Co., 280 Nevins St., Brooklyn, N. Y.

CHAMPION Safety Lock Co., Geneva, O.

CORBIN Cabinet Lock Co., New Britain, Conn.

READING Hardware Co., Reading, Pa.

SARGENT & Co., Water and Wallace Sts., New Haven, Conn.

SHELBY Spring Hinge Co., Shelby, O.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

CELLULOID

SHEET CELLULOID

(For windows in curtains and storm fronts)

ARLINGTON Co., 725-27 Broadway, New York, N. Y. "Pyralin."
(See page 185.)

CELLULOID Co., 80 Washington Pl., New York, N. Y.

PYRALIN—See Arlington Co.

CEMENT

CAST IRON CEMENT

(For repairing cracks in castings)

BRAND Co., S. H., 612 W. Monroe St., Chicago, Ill.

C-MEND-UM—See Central Foundry Supply Co.

CENTRAL Foundry Supply Co., W. Spring St. & H. V. Ave., Columbus, O. "C-Mend-Um."

CLARK Cast Steel Cement Co., Shelton, Conn., "Steamtite."

CLEVELAND Steel Cement Co., 406 O'Brien Bldg., Cleveland, O. "Noxal."

DIAMOND Expansion Bolt Co., 90 West St., New York, N. Y.

FIELD Radiator & Boiler Compound Co., Auburn, Me.

J-M LEAK-NO—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J-M Leak-No."

NORTHWESTERN Chemical Co., Marietta, O. "Se-Ment-Ol."

NOXAL—See Cleveland Steel Cement Co.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 533.)

SE-MENT-OL—See Northwestern Chemical Co.

SHELTON Metallic Filler Co., Shelton, Conn.

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

STEAMTITE—See Clark Cast Steel Cement Co.

MARINE CEMENT

BALTIMORE Copper Paint Co., Baltimore, Md.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

KUHLS, H. B. Fred, 23d St. & Third Ave., New York, N. Y.

PHOENIX Paint & Varnish Co., 124 Market St., Philadelphia, Pa.

TIRE REPAIR CEMENT

AKRON—See Empire Mfg. Co.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill.

ATLAS Auto Supply Co., 24 Adams St., Chicago, Ill. "Tire Doh."
(See page 157.)

BROOKLYN Rubber Co., 897 Sumner Ave., Brooklyn, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. and Erie R. R., Buffalo, N. Y.

COX, David H., Roselle, N. J.

DIAMOND Rubber Co., Akron, O. "Titan."
(See page 139.)

DUTCH—See Van Cleef Bros.

EAGLE Rubber Cement Co., 531 St. Joe Ave., Trenton, N. J.

EMPIRE Mfg. Co., Akron, O. "Akron."

EVER RIGHT—See Fry, Keyser.

FRY, Keyser, 616-22 N. Eighth St., Reading, Pa. "Ever Right."

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

HAZEN-BROWN Co., 101 South St., Boston, Mass. "Hazenoid."

HAZENOID—See Hazen-Brown Co.

LYON Rubber Co., Akron, O.

M. & M. Co., 414 Prospect Ave., Cleveland, O.
(See page 749.)

M. & M. Mfg. Co., Akron, O.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Rubber Co., Mansfield, O.

MICHELIN Tire Co., Milltown, N. J.

MORGAN & Wright, Detroit, Mich.

PARKS Co., F. B., 171 Prescott St., Grand Rapids, Mich.

PEERLESS Cement Co. 39 Viaduct, Akron, O.

PIONEER—See Van Cleef Bros.

RELIABLE Cement Co. (E. Akron), Akron, O.

REPUBLIC Rubber Co., Youngstown, O.

SEAMLESS Rubber Co., New Haven, Conn.
(See page 567.)

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Sell These Business Builders

Diamond
REPAIR MATERIAL

In air-tight, one-pound cartons expressly for repairmen and car owners using small quantities. Particularly well adapted for use with "Stitch-in-Time" or portable electric vulcanizer.

No waste. Exclusive Diamond quality. Unvulcanized tube patching stock for vulcanized tube repairs. Combination tube repair stock for inside work in vulcanized tube repairs. Unvulcanized tread stock for vulcanized surface repairs to casings.

For full particulars telegraph, telephone, write **Mr. Harris' desk.**

The New Diamond
CEMENTLESS PATCH

Immediate Repair for Punctures

Clean puncture thoroughly, apply patch, insert and inflate tube and go ahead.

The heat engendered by running the tire securely vulcanizes the patch. For full particulars telegraph, telephone, write **Mr. Harris' desk.**

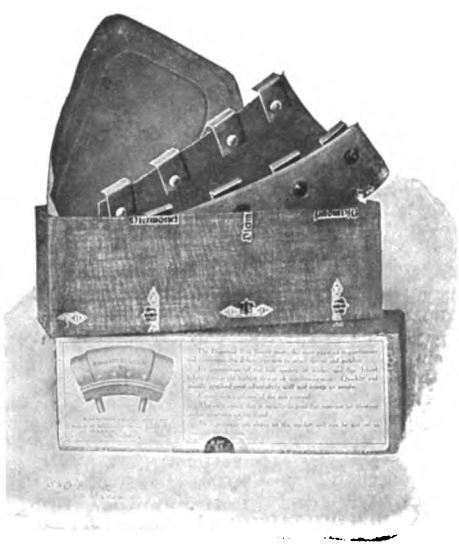
The New Diamond
TIRE SLEEVE

For Large Puncture, Rim-Cut or Stone Bruise

Quick, Neat and Lasting Repair

The Diamond Tire Sleeve, fitting inside and under the rim, closely envelopes the casing and holds a rim-cut or stone bruise as well as a puncture. Invaluable to both motorist and motor-cyclist.

A fabric patch to apply inside the casing to protect the inner tube in case of large injury, accompanies each Diamond Tire Sleeve. For full particulars telegraph, telephone, write **Mr. Harris' desk.**



THE DIAMOND RUBBER COMPANY, Akron, O.

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CEMENT (Continued)

TIRE REPAIR CEMENT (Continued)

SHAWMUT Tire Co., Boston, Mass. (See page 431.)

STAR Rubber Co., 405 Sweitzer Ave., Akron, O.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

TINGLEY & Co., Chas. O., Rahway, N. J.

TIRE-DOH—See Atlas Auto Supply Co.

TITAN—See Diamond Rubber Co.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill. "Dutch." "Pioneer."

WEARWELL Rubber Co., 107 S. Washington St., Marion, Ind.

WILLIAMS Mfg. Co., Camden, N. J.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.

CHAIN

MOTOR BOAT CHAIN

BLEECKER Sons, A., 44 South St., New York, N. Y.

COLUMBUS Chain Co., Columbus, O.

HAYDEN-CORBETT Chain Co., 182-228 Lorraine Ave., Columbus, O.

HOBBS, C. E., 12 Pearl St., Boston, Mass.

NEWHALL Chain, Forge & Iron Co., 90 West St., New York, N. Y.

ROUND & Son, D., Broadway & Marble St., Cleveland, Ohio.

SENECA Chain Co., Kent, O.

STANDARD Chain Co., Pittsburg, Pa.

WEIMER Chain & Iron Co., Lebanon, Pa.

WOODHOUSE Chain Works, Trenton, N. J.

WYATT Mfg. Co., Thos., 27 Wyatt St., Providence, R. I.

TRANSMISSION OR DRIVING CHAIN

AMERICAN High Speed Chain Co., 36 W. South St., Indianapolis, Ind.

BALDWIN Chain & Mfg. Co., Worcester, Mass. (See page 175.)

BRAMPTON—See Miller, Chas. E.

COVENTRY WORMOROLLER—See Hoffnung & Co.

CULVER-TAYLOR Chain Works, 140 Madison St., Detroit, Mich.

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind. (See page 141.)

HOFFNUNG & Co., 116 Broad St., New York, N. Y. (Importers.) "Coventry Wormoroller."

LINK-BELT Co., Indianapolis, Ind. "Renold," "Maximum." (See page 611.)

MAXIMUM—See Link-Belt Co.

MILLER, Chas. E., 97 Reade St., New York. N. Y. (Importer). "Brampton."

MORSE Chain Co., Ithaca, N. Y.

PEUGEOT Frères, 222 W. 58th St., New York, N. Y. (Importers.)

RENOLD—See Link Belt Co.

WHITNEY Mfg. Co., Hartford, Conn. (See page 705.)

MOTOR CYCLE DRIVE CHAIN

BALDWIN Chain & Mfg. Co., Worcester, Mass. (See page 175.)

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind. (See page 141.)

DUCKWORTH Chain & Mfg. Co., Springfield, Mass.

MORSE Chain Co., Ithaca, N. Y.

WHITNEY Mfg. Co., Hartford, Conn. (See page 705.)

CHAINS

MOTOR CYCLE TIRE CHAINS

WHITTAKER Chain Tread Co., Boston, Mass.

TIRE CHAINS

(For other Anti-Skid Devices—See Bands, Non-Skid also Treads, Detachable)

ATLAS Chain Co., Bush Terminal No. 4, Brooklyn, N. Y. (See page 143.)

AUTOFACTURERS Corp., 1777 Broadway, New York, N. Y. "Drag-On."

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

BESDAM—See Whittaker Chain Tread Co.

BRIDGEPORT Chain Co., Crescent Ave., Bridgeport, Conn. "Triumph."

CANNE, H. L., Milford, Pa.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHANNON Co., H., Market & Randolph Sts., Chicago, Ill.

CHICAGO Chain & Mfg. Co., 23 N. Jefferson St., Chicago, Ill.

CLEVELAND Chain & Mfg. Co., 7625 Broadway, Cleveland, O. "Wear Well."

CLEVELAND Wire Goods Co., Whitney Power Blk., Cleveland, O.

DRAG-ON—See Autofacturers Corp.

ENTERPRISE Chain Co., Trenton, N. J. "Morgan." (See page 661.)

EUREKA—See General Device Mfg. Co.

EVER READY—See Newhall Chain Forge & Iron Co.

FEGLEY Tire Chain Co., 301-03 West End Trust Bldg., Philadelphia, Pa.

GALLETT, Delbert, Aberdeen, S. D. "Simplex."

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Superior Grip." (See page 283.)

GENERAL Device Mfg. Co., 56 Pine St., New York, N. Y. "Eureka."

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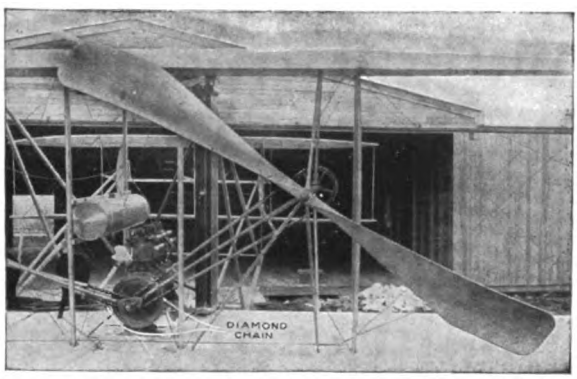
A Trying Service—But DIAMOND CHAINS HAVE MADE GOOD



After much experimenting the Wright Brothers chose Diamond Chain as the best medium for transmitting power from the engine to propellers on their biplanes. The Diamond Chains have proven so satisfactory that they are standard equipment on American-built machines and are also used on French Wright Biplanes in preference to chains made in Europe.

This installation is splendid proof of the real merit of Diamond Chains, for aviators can't afford to take chances. The driving chains, like all other parts of such a machine, must be absolutely dependable, regardless of cost. Don't understand this to mean that Diamond Chains are expensive, for they cost no more than others. It does mean, however, that if you have a hard problem for chain driving, you can well investigate Diamond Chains first, rather than come to them later.

We Make Sprockets to Order

The best chain made can't wear well or give good service unless its sprockets are accurately cut. If the pitch diameter of a sprocket is a few thousandths large or small, or if the teeth do not permit the chain to mesh and release freely there will be trouble sooner or later. Sprocket cutting should therefore not be intrusted to inexperienced hands.

We have complete outfits for machining sprockets to proper width, pitch, size, etc., for any roller or block chain, and do this work at low cost. By using only DIAMOND CHAINS, which have always been the American quality standard, and having us cut your sprockets, you avoid the uncertainty and trouble of careless workmanship, and you get drives that give maximum service at a minimum cost of upkeep.

Write for list of cars using Diamond Chains.

Diamond Chain and Mfg. Co.

231 West Georgia Street, Indianapolis, Ind.

Capacity 8,000,000 ft. per year

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CHAINS (Continued)

TIRE CHAINS (Continued)

HARTLEY Mfg. Co., Hartley, Iowa.

HAYDEN-CORBETT Chain Co., 182-228 Lorraine Ave., Columbus, O.

JOHNSON Sporting Goods Co., Iver, 163-65 Washington St., Boston, Mass.

LE-VIF—See Newhall Chain Forge & Iron Co.

LYON Non-Skid Co., 433 N. Broad St., Philadelphia, Pa.

McLAIN & Co., H. E., Pond & High Sts., Natick, Mass.
(See page 661.)

MID-WEST Motor Supply Co., 554 W. Jackson Blvd., Chicago, Ill.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium."
(See page 615.)

MILWAUKEE Tire Chain & Mfg. Co., 133 Second St., Milwaukee, Wis. "Pioneer."
(See page 749.)

MORGAN—See Enterprise Chain Co.

NEWHALL Chain Forge & Iron Co., 90 West St., New York, N. Y. "Ever Ready," "Presto," "Le-Vif."

PAX, John W., 331 Michigan Blvd., Chicago, Ill.

PEARSALL-TRAVER Mfg. Co., Far Rockaway, N. Y. "Reliance."

PERRY Chain Grip Co., 130 E. Washtenaw St., Lansing, Mich.

PIONEER—See Milwaukee Tire Chain & Mfg. Co.

PRESTO—See Newhall Chain Forge & Iron Co.

RADIUM—See Milwaukee Auto Specialty Co.

REAGAN Non-Skid Co., 209 N. Front St., Philadelphia, Pa.

RELIABLE Non-Skid Chain Co., 1428 Wabash Ave., Chicago, Ill.

RELIANCE—See Pearsall-Traver Mfg. Co.

SIMPLEX—See Gallett, Delbert.

SNITZ Chain Co., 253-55 Jefferson Ave., Detroit, Mich.

STANDARD Traction Tread Co., Larned & Third Sts., Detroit, Mich.
(See page 215.)

SUPERIOR GRIP—See Garage Equipment Mfg. Co.

TRIUMPH—See Bridgeport Chain Co.

VICTOR Tire Traction Co., 16 State St., Boston, Mass.

WALKER Chain Mat Co., Granville, N. Y.

WEAR WELL—See Cleveland Chain & Mfg. Co.

WEED Chain Tire Grip Co., 28 Moore St., New York, N. Y.
(See Back Bone.)

WHITTAKER Chain Tread Co., Boston, Mass. "Besdam."

CHAIRS

ARM, STEAMER AND CAMP CHAIRS

(See also Furniture, Wicker.)

BAILIE Basket Co., 82 Sudbury St., Boston, Mass.

HEYWOOD Bros. & Wakefield Co., Boston, Mass.

MESSINGER, W. D., 394 Boylston St., Boston, Mass.

WICKER-CRAFT Co., Newburgh, N. Y.

CHANNELS

PRESSED STEEL CHANNELS

(See Frames, Pressed Steel)

CHARTS

COAST & Geodetic Survey, Washington, D. C.

CHECKS

STEERING GEAR CHECKS

BADGER—See Universal Auto Sales Co.

BARKER, W. A., 20-22 S. Hoyne Ave., Chicago, Ill.

LITTLE STEERSMAN—See Modern Auto Appliance Co.

MODERN Auto Appliance Co., Chatham, N. Y. "Little Steersman."

UNIVERSAL Auto Sales Co., 1409 Michigan Ave., Chicago, Ill. "Badger."

CHIMNEYS

LAMP AND LANTERN CHIMNEYS

MACBETH-EVANS Glass Co., Pittsburg, Pa.

MUNSELL & Co., Eugene, 68 Church St., New York, N. Y.

CHRONOMETERS

MOTOR BOAT CHRONOMETERS

NEGUS, T. A. & J. D., 140 Water St., New York, N. Y.

CLAMPS

HOSE CLAMPS

BALZER Co., Gus., 1777 Broadway, New York, N. Y.

CATELAIN, A., 1446-48 Indiana Ave., Chicago, Ill.
(See page 505.)

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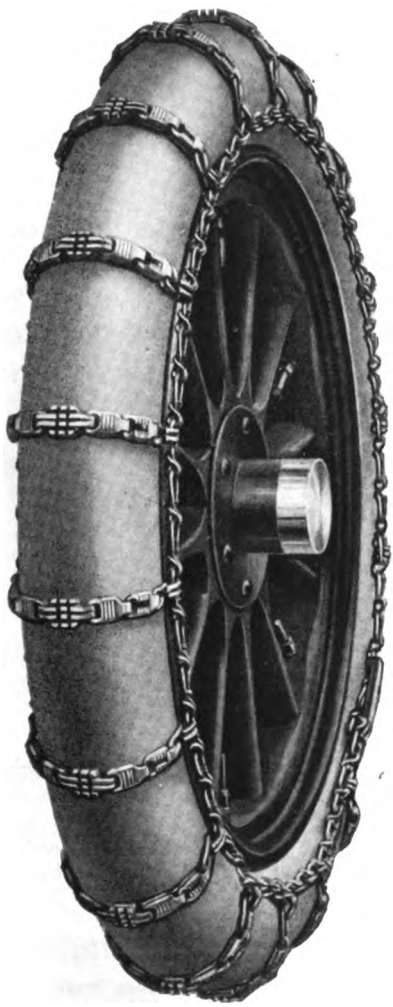

Atlas
Tire Chains

The ONLY non-skid chain in the world designed especially for the purpose.

Wear three times as long, are harmless to tires and much more efficient than any other tire chain.

"Make a Comparison"

Why not let us send you our catalogue and quote you our "SPECIAL TRADE PROPOSITION"?

Atlas Chain Co.
Bush Terminal Brooklyn, N. Y.

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CLAMPS (Continued)

HOSE CLAMPS (Continued)

CLANCY, J. R., 1010 W. Belden Ave., Syracuse, N. Y. "Redfield." "Sure Grip."

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HUDSON Hose Mender Co., Melrose, Mass.
(See page 671.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MORGAN, B., John St., Newport, R. I.

PHOENIX Hardware Mfg. Co., Homer, N. Y. "Star."

REDFIELD—See Clancy, J. R.

REID, T. B., 57 Early St., Morristown, N. J.

SCHRADER'S Son, A., 28-32 Rose St., New York, N. Y.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

STAR—See Phoenix Hardware Mfg. Co.

SURE GRIP—See Clancy, J. R.

SPRING REPAIR CLAMPS

AUTO Spring Repairer Co., 123 Liberty St., New York, N. Y.
(See page 197.)

WIRE ROPE CLAMPS

AMERICAN Hoist & Derrick Co., 63 S. Robert St., St. Paul, Minn.

BRODERICK & Bascom Rope Co., 809 N. Main St., St. Louis, Mo.

BULL DOG—See Lamson & Sessions Co.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O. "Bull Dog."

LANZ & Sons, Mathew, 2907 Carson St., Pittsburgh, Pa.

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

MACOMBER-WHYTE-MOON Co., 122 Centre St., New York, N. Y.

ROEBLING'S Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

WILCOX, Crittenden & Co., 82 Main St., Middletown, Conn.

CLEANERS

AUTOMOBILE ENGINE CLEANERS

BISHOP-BABCOCK-BECKER Co., 525 Garfield Bldg., Cleveland, O.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

LENNOX Chemical Co., 1201 E. 55th St., Cleveland, O.

GLASS WIND SHIELD CLEANERS

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O. "Bacher."

BACHER—See B. & B. Mfg. Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GROSSMAN Co., Emil, 248-50 W. 54th St., New York, N. Y. "Security."

SECURITY—See Grossman Co.

CLEATS

FIBRE WIRING CLEATS

(See also Fibre, Hard)

AMERICAN Vulcanized Fibre Co., **Equitable Bldg., Wilmington, Del.**

BLAKE Signal & Mfg. Co., 246 Summer St., Boston, Mass.

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y.
(See page 185.)

NATIONAL Fibre & Insulation Co., Yorklyn, Del.

WILMINGTON Fibre Specialty Co., Wilmington, Del.
(See page 185.)

CLEATS AND CHOCKS

KAUFMANN, Chas., Oshkosh, Wis.

LAUGHLIN CO., Thos., 143 Fort St., Portland, Me.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 349.)

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

MECHANICAL Devices Co., 917 Forst Ave., Watervliet, N. Y.

NEPTUNE Hardware Mfg. Co., 54 South St., New York, N. Y.

NORWALK Brass Co., Norwalk, Conn.

VALENTINE & Co., F. J., 178 Vermont St., Buffalo, N. Y.

CLIPS

CURTAIN CLIPS

(For attaching curtains to wind shields and bow sockets)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O. "Swan."

SWAN—See Standard Top & Equipment Co.

SPRING CLIPS

(See also Forgings, Drop)

ATWATER Mfg. Co., Southington, Conn.

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

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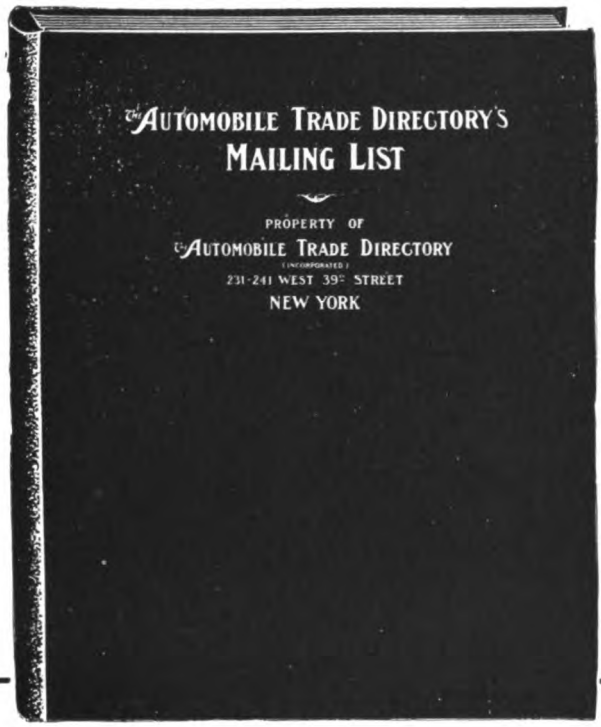

Here is a reduced fac-simile of THE AUTOMOBILE TRADE DIRECTORY'S MAILING LIST, a complete register of the names and addresses of all Automobile, Commercial Vehicle, Motor Boat, Motor Cycle and Aeroplane Manufacturers, together with the names of their Purchasing Agents, Mechanical Engineers, Superintendents, and other officials, also all Motor Manufacturers, and every Dealer, Agency and Supply House in the Automobile, Commercial Vehicle, Motor Boat, Motor Cycle and Aeronautic Industries as well as the names of all Automobile Garages, Repair Shops and Charging Stations.

This List is acknowledged to be the only complete work of its kind, and one in great demand among manufacturers, who "follow-up" their advertising through the mails.

Bear in mind the fact that this List is correct and kept "alive" through the issuance of monthly correction and revision sheets—these eliminating all dead names, adding all new names, and noting all changes of address.

You can secure this List for your own use—a letter of request will bring the details.

THE AUTOMOBILE TRADE DIRECTORY

243-249 West 39th Street, NEW YORK, N. Y.

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CLIPS (Continued)

SPRING CLIPS (Continued)

SEWARD & Son Co., M., Grant Sq., New Haven, Conn.

STRIEBY & Foote Co., 801 Ogden St., Newark, N. J.

UNION Forging Co., Union, N. Y. (See page 755.)

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

TOE CLIPS

BEVIN Bros. Mfg. Co., East Hampton, Conn.

EAST Hampton Bell Co., East Hampton, Conn.

SAGER—See Standard Co.

STANDARD Co., 52 Norwood St., Torrington, Conn. "Sager," "Star."

STAR—See Standard Co.

TRIMMERS CLIPS

MEYER & Co., John C., Lowell, Mass.

CLOCKS

DASHBOARD CLOCKS

(See also Holders, Watch)

BOSTON Clock Co., 16 State St., Boston, Mass. (See page 155.)

BRIARCLIFF—See Levy & Co.

CHELSEA Clock Co., 16 State St., Boston, Mass. (See page 147.)

COX Brass Mfg. Co., Albany, N. Y.

DIEPPE—See New Haven Clock Co.

DONALDSON & Fisher Co., 218-20 W. Kinzie St., Chicago, Ill.

FLORIDA—See Waterbury Clock Co.

FREUND & Bro., Henry, 71 Nassau St., New York, N. Y.

HOWARD Clock Co., E., 373 Washington St., Boston, Mass.

INGERSOLL & Bro., Robt. H., 45 John St., New York, N. Y.

JERICHO—See New Haven Clock Co.

JONES Speedometer Co., New Rochelle N. Y.

LARCHMONT Mfg. Co., Larchmont, N. Y.

LEVY & Co., Manasseh, 182 Broadway, New York, N. Y. "Briarcliff." "Safety."

MINEOLA—See New Haven Clock Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "York" (Importers.)

NEW Haven Clock Co., New Haven, Conn. "Jericho," "Westbury," "Mineola," "New Ormond," "Savannah," "Dieppe."

NEW ORMOND—See New Haven Clock Co.

OCALA—See Waterbury Clock Co.

PENSACOLA—See Waterbury Clock Co.

PHINNEY-WALKER Keyless Clock Co., 77 E. 130th St., New York, N. Y. (See page 711.)

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

SAFETY—See Levy & Co.

SAVANNAH—See New Haven Clock Co.

TAMPA—See Waterbury Clock Co.

WATERBURY Clock Co., Waterbury, Conn. "Florida," "Pensacola," "Tampa," "Ocala."

WESTBURY—See New Haven Clock Co.

YORK—See Motor Car Equipment Co.

MOTOR BOAT CLOCKS

ASHCROFT Mfg. Co., 85-89 Liberty St., New York, N. Y. (See page 559.)

BOSTON Clock Co., 16 State St., Boston, Mass. (See page 155.)

CHELSEA Clock Co., 16 State St., Boston, Mass. (See page 147.)

CROSBY Steam Gage & Valve Co., 95 Oliver St., Boston, Mass.

HOWARD Clock Co., E., 373 Washington St., Boston, Mass.

MARSH & Co., James P., 321-23 W. Washington St., Chicago, Ill.

NATIONAL Gauge Co., 168-72 Eighth St., Brooklyn, N. Y.

NEW Haven Clock Co., New Haven, Conn.

PHINNEY-WALKER Keyless Clock Co., 77 E. 130th St., New York, N. Y. (See page 711.)

WATERBURY Clock Co., Waterbury, Conn.

CLOSETS

MOTOR BOAT CLOSETS AND LAVATORIES

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

DIEM, Gus A., 20 Fulton St., New York, N. Y. "Fulton."

FULTON—See Diem, Gus A.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

LAWLEY & Son Corp., Geo., Neponset, Mass.

MARINE Hardware Co., Peabody, Mass.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

CLOTH

ENAMELED CLOTH

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

COOK'S Linoleum Co., Trenton, N. J.

MERITAS—See Standard Oil Cloth Co.

MUTTY Co., L. J., Boston, Mass. (See page 105.)

POTTER Sons & Co., Thos., 522 Arch St., Philadelphia, Pa.

STANDARD Oil Cloth Co., 320 Broadway, New York, N. Y. "Meritas."

Complete Index to Classification appears on Pages 8 to 22.

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THE 8-DAY HIGH GRADE "CHELSEA" AUTO CLOCK

"SPECIAL"

"OFFSET"

"ROUND"

"LIMOUSINE"

Primarily intended for use inside the bodies of large enclosed cars, and for such use its case can be given a variety of fine finishes. It also makes an attractive clock for use on dashboards. Only made in 2¾-inch size.

The Justly CELEBRATED 8-Day, High-Grade "CHELSEA" AUTO CLOCK (*Trade-mark*)

NOW and for YEARS the RECOGNIZED STANDARD of EFFICIENCY

Clocks built with a view to stand the jars and jolts and rough riding of Automobiles. Reputation the highest. Used by parties demanding the **BEST.**

☞ ALL SIZES STATED ARE THE APPROXIMATE DIAMETERS OF THE DIALS.

All are 8-day High-Grade. All are in DUPLEX (patent applied for) polished cast brass cases, the most thoroughly waterproof case on the market. The "SPECIAL" clocks show dial on an angle; its inner cased clock, when removed from the outer (locked) case, is excellent for use on mantels, bureaus, etc., when touring; its outer case is screwed to dashboard by hidden screws. The "SPECIAL" clocks are in large demand from dealers for owners of finest cars.

The MOTOR CLOCK has the same clock movement which for years we have supplied for the hard use on Locomotives, Steam Fire Engines, etc.; its dial is of same appearance as the Auto Clock dial, but the Auto Clock movement has a somewhat finer train.

The 3½ MOTOR "OFFSET" is likely to prove a quick, ready seller. Very attractive.

PRICE LIST (Per Clock)

		"Round"	"Offset"	"Special"	"Limousine"
"CHELSEA"	2¾-in. Auto Clock	$26.00	$28.00	$36.00	$28.50
	3½-in. Auto Clock	28.00	30.00	45.00	Only made in
	3½-in. Motor Clock	24.00	26.00	41.00	2¾-inch size

If wanted fitted with outside (patent applied for) stem-winding and stem-setting device — the best of its kind — **Add $2.75 to above Price Lists.** (Such device we do not apply to the "Specials")

For Use on AUTOMOBILES and MOTOR BOATS

CHELSEA CLOCK CO., 16 State St., Boston, Mass.

MORGAN & ALLEN CO., 150 Post St., San Francisco—Sales Agents, Pacific Coast and Colorado

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CLOTH (Continued)

MOHAIR CLOTH

CARR Co., F. S., Boston, Mass. (See page 177.)

CHASE & Co., L. C., Boston, Mass. (See page 149.)

FABRIKOID Works, Newburgh, N. Y. (See page 263.)

LOUNSBERY & Sons, G. H., Cincinnati, O. (Dealers.) (See page 555.)

HAARTZ, W. A. & J. C., 130-32 Lincoln St., Boston, Mass.

MUTTY Co., L. J., Boston, Mass. (See page 105.)

SCHERER & Co., H., Detroit, Mich.

RUBBER CLOTH

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

CARR Co., F. S., Boston, Mass. (See page 177.)

CHASE & Co., L. C., Boston, Mass. (See page 149.)

COOK'S Linoleum Co., Trenton, N. J.

EMPIRE Rubber Mfg. Co., Trenton, N. J.

FABRIC Rubberizing Co., Jefferson & 11th Sts., Hoboken, N. J.

FAIRFIELD Rubber Co., Fairfield, Conn.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

LOUNSBERY & Sons, G. H., Cincinnati, O. (Dealers.) (See page 555.)

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. (See page 105.)

UPHOLSTERY CLOTH

(See Broadcloth; also Silk; also Whipcord)

WIRE CLOTH

(For use in Strainers, Horn Screen, etc.)

AMERICAN Wire Cloth Co., Middlesex & Third Sts., Harrison, N. J.

BUFFALO Wire Works Co., Buffalo, N. Y.

CLINTON Wire Cloth Co., Clinton, Mass.

MICHIGAN Wire Cloth Co., 511 Howard St., Detroit, Mich.

NEW Jersey Wire Cloth Co., Trenton, N. J.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

CLOTHING

MOTORISTS CLOTHING

(See also Caps; also Gloves; also Leggings; also Mufflers)

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

ARMSTRONG, E. A., 208 W. Kinzie St., Chicago, Ill. "Impervo."

AUTO Raincoat Co., 118 E. 28th St., New York, N. Y.

AUTOMOBILE Apparel Co., 14 W. 22d St., New York, N. Y.

BALLARD & Co., J. O., Malone, N. Y.

BEATS ALL—See Standard Oiled Clothing Co.

BISHOP Co., J. H., Wyandotte, Mich.

BLAUVELT Knitting Co., 8 Campbell St., Newark, N. J.

BOYNTON'S Improved Pioneer Oil Clothing Co., Vincent St., Gloucester, Mass.

BRADLEY Knitting Co., Delavan, Wis.

CHICAGO Auto Robe Supply Co., 119-23 S. Market St., Chicago, Ill.

COOK & Bro., E. C., 326-30 Kinzie St., Chicago, Ill.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis.

ENTERPRISE Rubber Co., 110 Federal St., Boston, Mass.

FOREST Fur Co., 118½ E. 28th St., New York, N. Y.

FOX, Stiefel & Co., 349 Fifth Ave., New York, N. Y.

FULLER & Sullivan, 11-19 Elliot St., Boston, Mass.

GOLDWASSER & Co., L., 14 W. 22d St., New York, N. Y.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

GORDON—See Vehicle Apron & Hood Co.

GUNTHER'S Sons, C. G., 391 Fifth Ave., New York, N. Y.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

IMPERVO—See Armstrong, E. A.

KENYON Co., C., Broadway & 23d St., New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LEVY, M., 331 W. Broadway, New York, N. Y.

LUCENTA—See Regal Coat Co.

MANN Co., Leon, 715-19 Broadway, New York, N. Y.

MILFORD Shoe Co., 177 Central St., Milford, Mass.

MILLER & Son, Louis F., 722 Broadway, New York, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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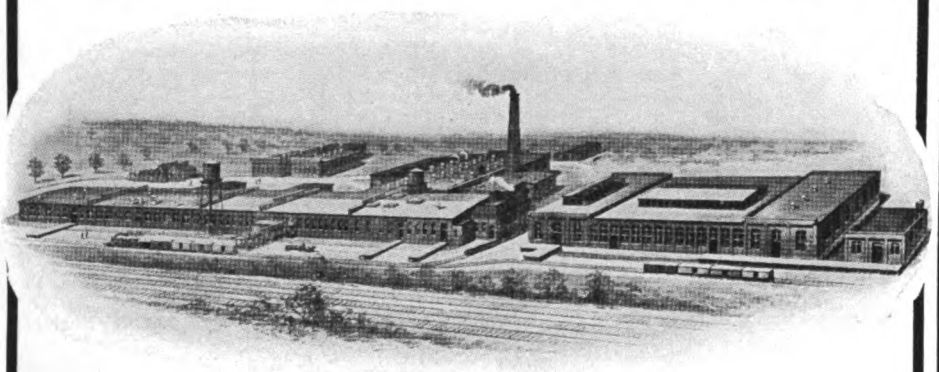
Chase Top Fabrics

For Automobiles & Carriages



The Chase Top Material Factories

The place where reputation dove-tails with quality and price.

Genuine Mohair Makintosh Cloth
Chase Leather

(The world's standard leather substitute)

Chase Rubber Cloths

It will be worth time and money to you to investigate the CHASE line when purchasing top materials, because our prices are right, quality is unequalled, and we mean to sustain our reputation.

L. C. CHASE & CO.

BOSTON NEW YORK CHICAGO SAN FRANCISCO

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CLOTHING (Continued)

MOTORISTS CLOTHING (Continued)

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

MORAWETZ Co., 817-25 E. Water St., Milwaukee, Wis.

NATIONAL Casket Co., 881-85 Wabash Ave., Chicago, Ill.

NEW York Leather Coat Co., 223 Wooster St., New York, N. Y.

OUR Own Mfg. Co., 576-78 Broadway, New York, N. Y.

PARKER Co., John H., 25 James St., Malden, Mass.

PONTIAC Knitting Co., Pontiac, Mich.

RAINO Co., 1828 S. Halsted St., Chicago, Ill.

REGAL Coat Co., 36 E. 12th St., New York, N. Y. "Lucenta."

REVILLON Freres, 19 W. 34th St., New York, N. Y.

ROGERS, Peet & Co., 258 Broadway, New York, N. Y.

ROSENTHAL & Katz, 11 W. 17th St., New York, N. Y.

ROSENWALD & Weil, Franklin & Congress Sts., Chicago, Ill.

RUSZITS Fur Co., John, 69-73 E. 11th St., New York, N. Y.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St., New York, N. Y.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

STANDARD Oiled Clothing Co., 152d St. & Tinton Ave., New York, N. Y. "Beats All."

TOPLITZ, George, 11 E. 22d St., New York, N. Y.

UPTHEGROVE Sporting Goods Co., Valparaiso, Ind.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

WALLACE Co., Hugh, Boulevard & Orleans St., Detroit, Mich.

WANCHET, Manfred, 34 E. 21st St., New York, N. Y.

WEINBERGS Son & Co., Ph., 290 Fifth Ave., New York, N. Y.

WILD & Co., Jos., 366-70 Fifth Ave., New York, N. Y.

WILKINSON Co., John S., Newburgh, N. Y.

OILED AND RUBBER CLOTHING

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

NICKERSON, Levi, 90 Rogers St., Gloucester, Mass.

STANDARD Oiled Clothing Co., 152d St. & Tinton Ave., New York, N. Y.

TOWER Co., A. J., Vernon & Simmon Sts., Boston, Mass.

CLUTCHES

AUTOMOBILE FRICTION CLUTCHES

AKRON—See Williams Foundry & Machine Co.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

CONSTRICTOR—See Warner Clutch Co.

DIEBOLD-PETERS Co., Whitney Power Bldg., Cleveland, O.

EDGEMONT Machine Co., Washington & Mound Sts., Dayton, O.

HARTFORD Auto Parts Co., 83 Huyshope Ave., Hartford, Conn. (See page 251.)

HELE-SHAW—See Merchant & Evans Co.

HILLIARD Clutch & Machinery Co., 104 W. Fourth St., Elmira, N. Y. (See page 629.)

JOHNSON Service Co., Milwaukee, Wis.

KIRKHAM Motor Mfg. Co., Bath, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa. (See page 73.)

LONG Arm System Co., Cleveland, O.

McCUE Co., Hartford, Conn. (See pages 71 and 291.)

MERCHANT & Evans Co., Philadelphia, Pa "Hele-Shaw."

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

MODEL Gas Engine Works, Peru, Ind. "Wells." (See page 577.)

MOORE & White Co., 15th St. & Lehigh Ave., Philadelphia, Pa.

NATIONAL Brake & Clutch Co., 16 State St., Boston, Mass. (Cork Insert Frictions only.) (See page 165.)

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.

PRUYN & Bilodean, 305 Border St. (E. Boston), Boston, Mass.

REED Mfg. Co., Kalamazoo, Mich. (See page 609.)

SMITH Co., A. O., Milwaukee, Wis. (See page 397.)

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O. (See page 579.)

VERGES Machine Co., Enterprise Bldg., Milwaukee, Wis.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Clutch Co., Railway Exchange Bldg., Chicago, Ill. "Constrictor."

WARNER Gear Co., Muncie, Ind. (See page 151.)

WARNER Mfg. Co., Toledo, O. (See page 209.)

WAUKESHA Motor Co, Waukesha, Wis. (See page 287.)

WELLS—See Model Gas Engine Works.

WILLIAMS Foundry & Machine Co., Ash St., Akron, O. "Akron." (See page 735.)

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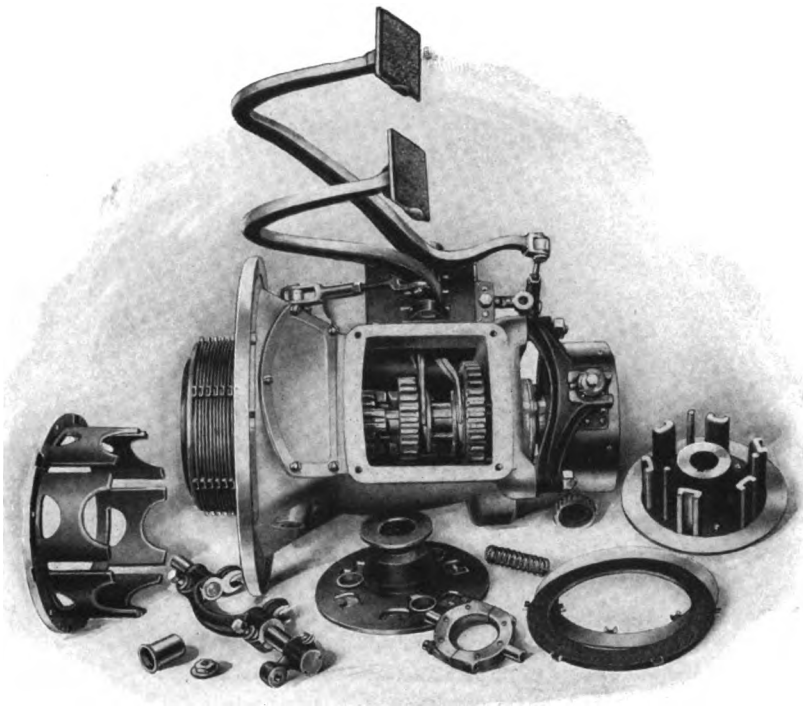

MODEL 95—Unit Transmission, Brake and Clutch, With Raybestos-Faced Discs. Pedals Attached. 25-35 H. P.

"Out of the Ordinary"

Our work is the designing and building of a distinctly better class of

TRANSMISSIONS, DIFFERENTIALS, STEERING GEARS, CONTROL LEVERS AND CLUTCHES

Our appeal for business is to those who desire something that is quite different from the usual; something that carries full dependability and freedom from any possibility of failure, breakage or call for frequent renewals.

Our prices are consistently low, thru thorough standardization of product, superior manufacturing facilities, and efficient plant organization.

1911 CATALOG UPON REQUEST

WARNER GEAR COMPANY

Muncie, Indiana

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CLUTCHES (Continued)

FREE ENGINE CLUTCHES

(See also Gears, Transmission)

BEEHLER & Ogden, 723 Gaither Bldg., Baltimore, Md.

ECLIPSE Machine Co., Elmira, N. Y.

MARINE OR MOTOR BOAT CLUTCHES

(See Gears, Marine Reverse)

COATS

AUTOMOBILE COATS

(See Clothing, Motorists)

COCKS

SEA COCKS

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

DIEM, Gus A., 20 Fulton St., New York, N. Y.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

SANDS & Son, A. B., 22-24 Vesey St., New York, N. Y.

SPRING KEY COCKS

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

PRICE & Co., C. B., Tribune Bldg., New York, N. Y. (Dealers.) (See page 171.)

STANDARD Brass Works, 528 Woodbridge St., E. Detroit, Mich.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

STANDARD PET COCKS

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

AMERICAN Lubricator Co., 93 Catherine St., Detroit, Mich.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BELKNAP Mfg. Co., Bridgeport, Conn.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

EAGLE Brass Works, Dubois & Franklin Sts., Detroit, Mich.

HAYDENVILLE Co., Haydenville, Mass.

HOMER Brass Works, 281 Race St., Philadelphia, Pa.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 227-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

NOLTE Brass Co., Springfield, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Holliday & Saratoga Sts., Baltimore, Md.

ROBERTS Brass Mfg. Co., 1395-1407 Fort St., W., Detroit, Mich.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SOUTH Park Mfg. Co., Port Huron, Mich.

STANDARD Brass Works, 528 Woodbridge St., E. Detroit, Mich.

UNION Brass Works, 355-63 Harper Ave., Detroit, Mich.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

COILS

PIPE COILS

NATIONAL Pipe Bending Co., New Haven, Conn. (See page 161.)

SPARK COILS

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Electric Fuse Co., Muskegon, Mich. "Americoil." (See page 745.)

AMERICOIL—See American Electric Fuse Co.

APPLE—See Dayton Electrical Mfg. Co.

ATWATER Kent Mfg. Works, 44 N. Sixth St., Philadelphia, Pa. (See page 747.)

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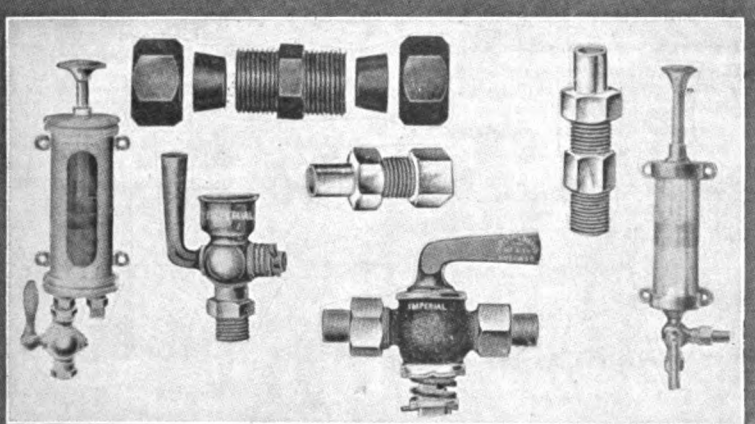
THE

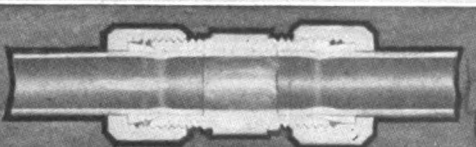
IMPERIAL BRASS MFG. CO.

440-452 SO. JEFFERSON ST.
CHICAGO, ILL.

We manufacture a complete and varied line of Air Pumps, Water Pumps, Oil Pumps, Priming Cups, Gasoline Valves and Cocks, Pipe Fittings, Robe Rails, Handles, Regulators. Also, Imperial Compression Couplings.

Let us supply you with any of these auto requisites. You will find them of fine finish and high grade quality.





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COILS (Continued)

SPARK COILS (Continued)

AUTOCOIL Co., 132 7th St., Jersey City, N. J.

BLISS—See Federal Mfg. Co.

BOSCH Magneto Co., 223-25 W. 46th St., New York, N. Y. (See page 279.)

CENTRAL Insulating Co., Lafayette, Ind. "Cico."

CICO—See Central Insulating Co.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn. (See page 369.)

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O. "Apple."

DAYTON Engineering Laboratories Co., Dayton, O. "Delco." (See page 747.)

DELCO—See Dayton Engineering Laboratories Co.

DOW Mfg. Co., Braintree, Mass.

DUPLEX Electric Co., 13 McWilliams St., Fond-du-lac, Wis. (See page 771.)

FEDERAL Mfg. Co., 194 Cushing St., Lowell, Mass. "Bliss."

FISH Systems Co., Majestic Bldg., Indianapolis, Ind.

HEINZE Electric Co., Lowell, Mass.

HERZ & Co., Puck Bldg., New York, N. Y. (Importers.) (See page 335.)

HIGH Frequency Ignition Coil Co., 126½ E Main St., Los Angeles, Cal. "Seeley."

HOLTZER-CABOT Electric Co., Boston, Mass. (See page 413.)

JACOBSON-BRANDOW Co., Pittsfield, Mass. (See page 413.)

K-W IGNITION Co., 35 Power Ave., Cleveland, O.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. **"Quick Action."**

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. **"Kingston."**

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass. "Worcester."

LEMKE Electric Co., 280-82 Lake St., Milwaukee, Wis.

LINDSLEY & Allen Electric Co., Providence, R. I. "Solocoil."

LUNDGREN Mfg. Co., 308 Hale Bldg., Philadelphia, Pa.

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y. "Mesco." (See page 615.)

MENOMINEE Electric Mfg. Co., Menominee, Mich.

MESCO—See Manhattan Electrical Supply Co.

MUS-KEE-GON—See Muskegon Coil Co.

MUSKEGON Coil Co., Muskegon, Mich. "Mus-Kee-Gon."

NATIONAL Coil Co., Lansing, Mich. (See page 245.)

NEW York Coil Co., 338-40 Pearl St., New York, N. Y.

NOXON, C. Per Lee, 500 East Water St., Syracuse, N. Y.

PFANSTIEHL Electrical Laboratory, 119 State St., North Chicago, Ill. (See page 677.)

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 277.)

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

RAPID FIRE—See Tritt Electric Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SEELEY—See High Frequency Induction Coil Co.

SOLOCOIL—See Lindsley & Allen Electric Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 719.)

STERLING Co., Lafayette, Ind.

THORDARSON Electric Mfg. Co., 216-20 Jefferson St., Chicago, Ill.

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Rapid Fire." "Veribest."

VERIBEST—See Tritt Electric Co.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WORCESTER—See Leland & Co.

COLORS

COACH COLORS

(See Paints and Colors)

COLUMNS

WATER COLUMNS AND BOILER ALARMS

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

RELIANCE Gauge Column Co., 45 E. Prospect St., Cleveland, O.

COMMUTATORS

ELECTRIC MOTOR COMMUTATORS

CAMERON Electric Mfg. Co., Ansonia, Conn.

COLUMBIA Machine Works & Malleable Iron Co., Chestnut St. & Atlantic Ave., Brooklyn, N. Y.

EUREKA Tempered Copper Works, Northeast, Pa.

HOMER Commutator Co., Cleveland, O.

VAN Dorn & Dutton Co., 2714 E. 79th St., Cleveland, O.

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The illustrations below show in Reduced Size the General Style of the Various Models of **The "BOSTON" 8-DAY HIGH-GRADE AUTO CLOCK**

Model A
In 3 sizes—see Price List

Model B
In 3 sizes—see Price List

Model C
Adjustable to various angles by Ratchet and Nut at back. In general appearance it closely matches many makes of speedometers. In 3 sizes—see Price List.

Model D
In 3 sizes—see Price List

Secured to Dashboard by Safety Locking Device.
Model E
In 3 sizes—see Price List

The Illustrations below show the (patent applied for) STEM WINDING and STEM SETTING Device

On Models A, B and C it projects through side of case. On Models D and E it projects through bottom of case and eliminates seconds dials. Compact and effective. IF CLOCKS wanted FITTED with this device, ADD **$2.50** to Price Lists.

PRICE LIST

Size	Models A, B, C	Model D	Model E
3-inch.....	$15.00	$18.00	$21.00
3½-inch.....	16.50	21.00	24.00
4-inch.....	18.00	24.00	27.00

☞ Add $2.50 to above prices if want fitted with the stem wind and stem setting device.

In ordering, state the model and size wanted.

The movements are 8-day, high-grade, very rigidly built, are 7-jeweled and have Breguet hairsprings and compensation balances with timing and balance screws, etc., and are secured by screws through back of case—the best possible way.

The cases are of the approved "screw bezel," water and dust proof type and are made of polished brass but "to order" will be finished Nickelled.

MORGAN & ALLEN CO.
150 Post St., San Francisco, Cal.
SALES AGENTS Pacific Coast and Colorado

BOSTON CLOCK CO., 16 State Street, Boston, Mass., U. S. A.

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COMMUTATORS (Continued)

SPARK COMMUTATORS

(See Timers, Ignition)

COMPASSES

DRY AND LIQUID COMPASSES

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

DIRIGO—See Sherman, Eugene M.

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

MARINE Compass Co., Bryantville, Mass. "Polaris."

MERRILL'S Sons, R., 66 South St., New York, N. Y.

NEGUS, T. S. & J. D., 140 Water St., New York, N. Y.

POLARIS—See Marine Compass Co.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

SCHUETTE Recording Compass Co., Manitowoc, Wis.

SHERMAN, Eugene M., Reed St., Lexington, Mass. "Dirigo."

TAYLOR Instrument Cos., Rochester, N. Y.

UNITED States Compass Co., Milwaukee, Wis.

COMPOUNDS

ANTI-FREEZING COMPOUNDS

AUTOMOBILE Equipment Co., 260 Jefferson Ave., Detroit, Mich. "Zerozene."

BERINGER, George M., Camden, N. J.

BLIZZARD—See Globe Soap Co.

CONSOLIDATED Chemical Co., 208 W. Kinzie St., Chicago, Ill.

COOK-PEARY—See Hazen-Brown Co.

GLOBE Soap Co., Cincinnati, O. "Blizzard."

HAZEN-BROWN Co., 101 South St., Boston, Mass. "Cook-Peary."

MARX & Rawolle, 100 William St., New York, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NORTHWESTERN Chemical Co., Marietta, O. "Thermite."

THERMITE—See Northwestern Chemical Co.

ZEROZENE—See Automobile Equipment Co.

CYLINDER CLEANSING COMPOUNDS

AUTOPOWER—See Lakewood Chemical Co.

CAM—See Murphey Mfg. Co.

CARBONOX—See Northwestern Chemical Co.

CHICAGO Automobile Supply House, 1355 Michigan Blvd., Chicago, Ill.

DETROIT Varnish Co., Milwaukee St. & Widman Pl., Detroit, Mich. "Rogers."

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FLASH Mfg. Co., Zanesville, O. (See page 157.)

FRENCH Compression Fluide Co., 62 S. Fair Oaks Ave., Pasadena, Cal.

HARVEY Chemical Co., N. Fifth St., Lafayette, Ind.

KREMBS & Co., 722 Waldo Pl., Chicago, Ill. "Purgcarbon."

LAKEWOOD Chemical Co., 805 Citizens Bldg., Cleveland, O. "Autopower."

McCULLOUGH & Son, J. H., 219 N. Broad St., Philadelphia, Pa. "Peerless."

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium-Decarbonizer." (See page 615.)

MURPHEY Mfg. Co., Sioux City, Ia. "Cam."

NORTHWESTERN Chemical Co., Marietta, O. "Carbonox."

OWL—See Western Chemical Mfg. Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y. "Wheatley."

PEERLESS—See McCullough & Son.

PREST-O-LITE Co., 1400 E. South St., Indianapolis, Ind. (See pages 157 and 417.)

PURGCARBON—See Krembs & Co.

RADIUM-DECARBONIZER—See Milwaukee Auto Specialty Co.

RELIABLE Cement Co. (E. Akron) Akron, O.

ROGERS—See Detroit Varnish Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

THERMO Efficiency Co., Clifton Heights, Pa.

VELVET—See Sutherland & Co.

WESTERN Chemical Mfg. Co., 203 Fourth St., Milwaukee, Wis. "Owl."

WHEATLEY—See Panama Oil & Grease Co.

WHITNEY Chemical Co., 6122 Euclid ave., Cleveland, O.

GLASS WIND SHIELD COMPOUNDS

(For keeping glass clear in rain or fog)

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz Kleer-Glass."

RELIABLE Cement Co., (E. Akron) Akron, O.

WHIZ KLEER-GLASS—See Hollingshead Co.

RADIATOR CLEANING COMPOUNDS

BANNER—See Cortland Specialty Co.

C-R Supply Co., 410 Elm St., Ottawa, Kans. "Radi-No-Leak."

CALLAHAN & Co., John, 35 S. Clinton St., Chicago, Ill. "Fluff-Foe."

COLZA Chemical Co., 213 Mutual Life Bldg., Buffalo, N. Y.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

Complete Index to Classification appears on Pages 8 to 22.

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FLASH Decarbonizer

FLASH GOES IN; CARBON GOES OUT

Sure results, and the way it does it.

When **FLASH** and carbon come into contact at a high temperature, the tiny particles explode, shattering each other and creating a fine dust or vapor. No matter how hard or how encrusted the carbon or silicon, **FLASH** decays and removes it from the Cylinders, Pistons, Piston Rings, Spark Plugs, Valves, etc., etc., and spits it into the exhaust.

For your own satisfaction, we want you to try one can of this Celebrated Cylinder Cleansing Compound.

Sold by Automobile Supply Dealers generally throughout the world. Or by mail for $1, postpaid.

WRITE FOR DESCRIPTIVE LITERATURE AND TRADE TERMS

THE FLASH MFG. CO.
Zanesville, Ohio, U. S. A.

MANUFACTURERS

TIRE-DOH

Repairs Punctures, Blowouts, Cuts and Blisters in Tubes and Casings. No Patches, Vulcanizer or Acids.

Atlas Underground Gasoline Outfits, Gasoline and Oil Tanks and Pumps.

Atlas Gasoline Funnels (No Chamois) Never Fail to Separate Water, Oil and Dirt from Gasoline.

STA-BRITE

Keep Your Brass Bright. It Prevents Tarnishing or Corroding When Coated With STA-BRITE.

ATLAS AUTO SUPPLY COMPANY
24 ADAMS ST., CHICAGO

Prest-O-Carbon Remover

Heavy carbon deposit after 2000 miles

Try It In Your Shop

We claim that this liquid will loosen and remove all carbon deposits, doing a better job than scraping, and involving only a fraction of the time, labor and expense.

In the light of this, aren't you wasting a lot of valuable shop time ?

By using Prest-O-Carbon Remover, you can give your customer a better job, charge him less, please him better, and yet make a better profit.

Requires almost no labor or shop time. The liquid, standing in the cylinders, does the work. Positively cannot harm the metal. Beware of imitations containing strong acids.

Retail price: Gal. $3.75; Half Gal. $2.00; Quart $1.00. Discounts to the trade. Order a can and try it.

The Prest-O-Lite Co.
1400 E. South St., Indianapolis, Ind.

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COMPOUNDS (Continued)

RADIATOR CLEANING COMPOUNDS (Continued)

DECALCIFIER—See Milwaukee Auto Specialty Co.

ELDER Mfg. Co., 2305 N. Illinois St., Indianapolis, Ind. "Radio-Cooler."

FIELD Auto Compound Mfg. Co., Auburn, Me.

FLUFF-FOE—See Callahan & Co.

HAZEN-BROWN Co., 101 South St., Boston, Mass. "R. R. R."

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Decalcifier."
(See page 615.)

NONKORODA Co., 25-27 New Chambers St., New York, N. Y.

R. R. R.—See Hazen-Brown Co.

RADI-NO-LEAK—See C-R Supply Co.

RADIO-COOLER—See Elder Mfg. Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

STRAUS Boilerine Co., 55 Broad St., New York, N. Y.

VELVET—See Sutherland & Co.

RUST PREVENTING COMPOUNDS

CEDAROLEUM Co., Perkinsville, Vt.

FLEXIBLE Compound Co., 303 Great Northern Bldg., Chicago, Ill.

MELVILLE, F. L., Bayonne, N. J.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y.

TIRE PRESERVING COMPOUNDS

HENDERSON Bros., Rye, N. Y.

MYHTIB Rubber Tire Preserver Co., Hartford, Conn.

NORTHWESTERN Chemical Co., Marietta, O. "Tire-Lac."

RUBBERLIFE Mfg. Co., Shephard Bldg., Grand Rapids, Mich.

TIRE-LAC—See Northwestern Chemical Co.

TIRENE Chemical Co., Clarion, Iowa.

TIRE REPAIR COMPOUNDS

(Compound for filling cuts in outer casings)

ATLAS Auto Supply Co., 24 Adams St., Chicago, Ill. "Tire-Doh."
(See page 157.)

C. O. T. GUM GUM—See Tingley & Co.

COX, David H., Roselle, N. J.

FILLEM—See Greenwald Rubber Co.

HAZEN-BROWN Co., 101 South St., Boston, Mass. "Nu-Tread."

KNEAD-IT—See M. & M. Mfg. Co.

M. & M. Mfg. Co., Akron, O. "Knead-it."

MASTIC—See Michelin Tire Co.

MICHELIN Tire Co., Milltown, N. J. "Mastic."

NU-TREAD—See Hazen-Brown Co.

TINGLEY & Co., C. O., Rahway, N. J "C. O. T. Gum Gum."

TIRE-DOH—See Atlas Auto Supply Co.

TOLEDO Auto Devices Co., 710 Gardner Bldg., Toledo, O.

VALVE GRINDING COMPOUNDS

AUTO Equipment Co., 32 Hollywood Ave., E. Orange, N. J. "Eureka."

BORNSCHEIN & Co., John F., 2351 Indiana Ave., Chicago, Ill. "E. Z.," "X. L.," "Peerless."

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

CARBORUNDUM Co., Niagara Falls, N. Y.
(See page 507.)

CLOVER Mfg. Co., 151 E. 126th St., New York, N. Y.

E. Z.—See Bornschein & Co.

EUREKA—See Auto Equipment Co.

GRINDINE—See Victor Auto Supply Mfg. Co.

GRYNDYN—See Pearsall Bros.

MOHAWK Grinding Paste Mfg. Co., Albany, N. Y.

NATIONAL Valgrinok Co., 195 Church St., Newton, Mass. "Valgrinok."

PEARSALL Bros., Morristown, N. J. "Gryndyn."

PEERLESS—See Bornschein & Co.

RAPIDCUT—See S. B. R. Specialty Co.

RIE-NIE Mfg. Co., 919 First Ave., S., Minneapolis, Minn.
(See page 331.)

S. B. R. Specialty Co., E. Orange, N. J. "Rapidcut."
(See page 451.)

VALGRINOK—See National Valgrinok Co.

VICTOR Auto Supply Mfg. Co., 45 W. 43d St., New York, N. Y. "Grindine."
(See pages 376 and 377.)

X. L.—See Bornscheim & Co.

CONDENSERS

STEAM CONDENSERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

DETROIT Radiator Co., Detroit, Mich.

ROME-TURNEY Radiator Co., Rome, N. Y.

WALKER Mfg. Co., E. C., Jackson & Lampton Sts., Louisville, Ky.

CONES

BALL CONES

(See Cups, Ball)

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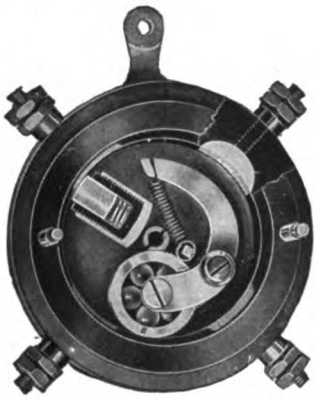
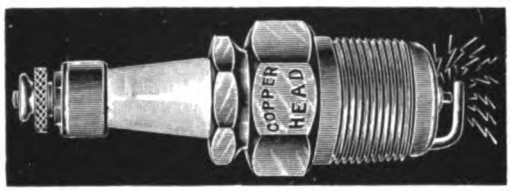
SPECIALTIES FOR THE AUTO TRADE



THE MAXIMUS TIMER

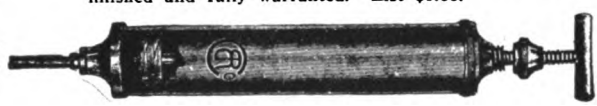
(Note self-cleaning feature.) Admittedly the best timer yet brought out.



THE COPPERHEAD PLUG

(Best Dollar Plug.)

A 1911 product just coming through. Imported Porcelain. Extra high grade, finely made, handsomely finished and fully warranted. List $1.00.



MAXIMUS GREASE GUN

Piston ring construction, with rings ground to perfect fit. A perfect tool. List, $4.00.

BLUE RIBBON EXHAUST HORN

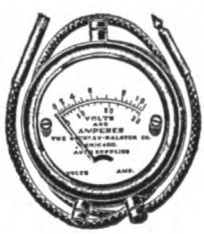
A four-tone chime of the highest grade, solid brass sixteen inches long and 2½ inches in diameter. Guaranteed not to shriek on high speed and to be perfect in tone, material and workmanship. Complete with Butterfly exhaust valve and all-brass foot pedal.

List each, complete, $10.00.

CLOVERLEAF CLOCK

(For autos and motorcycles.) Neat and attractive; well made, well finished and fully warranted.

List each, $3.50.

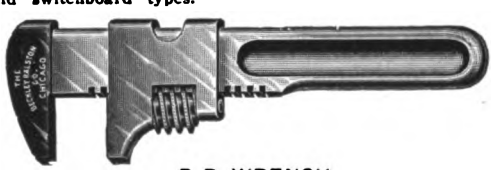


METERS

Oldest and best known line of ampere and volt meters, wide range of styles and sizes, both pocket and switchboard types.

ELECTRIC LAMPS

High-grade head lights, side lights and tail lights in electric. High class and at low prices.



B-R WRENCH

A complete line of auto and machinists' tools. High-class assortment of auto tool rolls.

Manufacturer for Auto Jobber and Dealer

THE BECKLEY-RALSTON COMPANY

Michigan Avenue and Randolph Street CHICAGO

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CONNECTIONS

BRASS WATER CONNECTIONS

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn. (See page 383.)

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

TURNER Brass Works, Sycamore, Ill.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WESTERN Brass Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

WILKINSON Co., Wm. H., West Medway, Mass.

GAS TUBING CONNECTIONS

COX Brass Mfg. Co., Albany, N. Y.

GOODWIN & Kintz Co., Winsted, Conn.

MORGAN, B., John St., Newport, R. I.

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

STEERING CONNECTIONS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

CINCINNATI Ball Crank Co., Cincinnati, O. (See page 543.)

DAVIS & Co., W. J., 716 Tenth Ave., New York, N. Y.

FOSTER Gear Co., 244-46 Kaiser St., Columbus, O.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

TIRE PUMP CONNECTIONS

ACORN—See Stevens & Co.

AUSTIN & Co., H. K., 23 Lincoln St., Reading, Mass.

AUTO Equipment Mfg. Co., 18 Pearl St., Newton, Mass. "Nielsens."

BOSS—See Stevens & Co.

BULL DOG—See Stevens & Co.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

ECLAIR—See Stevens & Co.

EVERTIGHT—See Smith Bros.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GRAB—See Motor Car Equipment Co.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. (See page 339.)

KENO—See Stevens & Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Grab."

NIELSENS—See Auto Equipment Mfg. Co.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOERA Mfg. Co., Waterbury, Conn. (See page 635.)

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.

PERFECT—See Youse & Daddow.

PERFECTION—See Stevens & Co.

PITNER Pump Co., 30 W. Michigan St., Chicago, Ill. (See page 635.)

SCHRADER'S Son, A., 30-32 Rose St., New York, N. Y.

SMITH Bros., 12-14 Essex St., Melrose, Mass. "Evertight."

STEVENS & Co., 375 Broadway, New York, N. Y. "Keno." "Swivel K." "Perfection." "Boss." "Bull Dog." "Acorn." "Eclair." (See page 161.)

SWIVEL K—See Stevens & Co.

YOUSE & Daddow, 46 N. Fifth St., Reading, Pa. "Perfect."

CONNECTORS

BATTERY CONNECTORS

(See also Terminals, Wire)

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Bull Dog."

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BASCO—See Briggs & Stratton Co.

BECCO—See Beck Co.

BECK Co., Rockville Center, N. Y. "Becco." (See page 163.)

BLISS-CHESTER Co., Providence, R. I. (See page 421.)

BOLTON, Geo. W., 733 Woodward Ave., Detroit, Mich. "Perfecto." "Simplex."

BRIGGS, Daniel, 329 Chestnut St., Richmond Hill, N. Y.

BRIGGS & STRATTON Co., Milwaukee, Wis. "Basco." (See page 423.)

BULL DOG—See American Ever Ready Co.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy." (See page 61.)

ELECTRIC Motor & Equipment Co., 232 Market St., Newark, N. J.

GOODSON Electric & Mfg. Co., Providence, R. I.

HANDY—See Chicago Electric Mfg. Co.

HARVARD Electric Co., 525 Van Buren St., Chicago, Ill.

HERZ & Co., Puck Bldg., New York, N. Y. (See page 335.)

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

LEMKE Electric Co., 280-82 Lake St., Milwaukee, Wis.

Complete Index to Classification appears on Pages 8 to 22.

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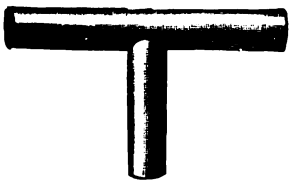
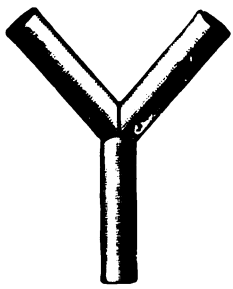
Copper Tubing Connections





Castings, or Seamless Tubing Brazed, All Sizes and Styles

We are the originators of this line and can still name original prices for quantities.

STEVENS & CO., 375 Broadway, NEW YORK

FOR BEST QUALITY

MATERIALS WORKMANSHIP AND PROMPT DELIVERIES

NATIONAL PIPE BENDING CO.

NEW HAVEN, CONN.

ALL STYLES OF

BENDS

of

BRASS COPPER IRON AND STEEL

The quality of our products is too well known to need comment. We guarantee satisfaction in promptness and price.

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CONNECTORS (Continued)

BATTERY CONNECTORS (Continued)

LOBSTER CLAW—See Tregoning Electric Mfg. Co.

LOCKWOOD Ash Motor Co., 210 W. Cortland St., Jackson, Mich.

LOMBARDI Motor Co., Derby, Conn.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y. "Sta-There."
(See page 615.)

MILLS—See Stackpole Battery Co.

MONROE Electric Mfg. Co., Box 57, Monroe, Mich.
(See page 631.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NATIONAL Carbon Co., Cleveland, O.
(See page 333.)

NEVER-MISS Mfg. Co., Lansing, Mich.
(See page 421.)

PERFECTO—See Bolton, Geo. W.

SHAIN, Chas. D., 1926 Broadway, New York, N. Y.
(See page 589.)

SIMPLEX—See Bolton, Geo. W.

STA-THERE—See Manhattan Electrical Supply Co.

STACKPOLE Battery Co., St. Marys, Pa. "Mills."
(See page 653.)

STANDARD Battery Connection Co., 27 Copeland St., Roxbury, Mass.

TREGONING Electric Mfg. Co., 418 W. Prospect Ave., Cleveland, O. "Lobster Claw."

ELECTRIC LAMP CONNECTORS

C-S—See Culver-Stearns Mfg. Co.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy."
(See page 61.)

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass. "C-S."

HANDY—See Chicago Electric Mfg. Co.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

VEST Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."
(See page 163.)

CONTROLLERS

ACETYLENE LAMP CONTROLLERS

SCHEU-DEXTER Mfg. Co., 129 Bridge St., Springfield, Mass.

ELECTRIC MOTOR CONTROLLERS

(For varying speed of electric vehicles)

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 679.)

GENERAL Electric Co., Schenectady, N. Y.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

COOLERS

WATER COOLERS

(See Radiators, Water Cooling)

COPPER

SHEET AND ROD COPPER

(See Brass, Sheet)

TUBE COPPER

(See Tubing, Brass)

CORDAGE

BIBB Mfg. Co., Macon, Ga.

CANONCHET Line & Twine Co., Canonchet, R. I.

COLUMBIAN Rope Co., Auburn, N. Y. "Eureka."

EUREKA—See Columbian Rope Co.

HOOVEN & Allison Co., Xenia, O.

JACOBS-MILLER Co., 18 E. Fourth St., Cincinnati, O.

LAMBETH Rope Corp., New Bedford, Mass.

OVERMAN & SCHRADER Cordage Co., Covington, Ky.

PORTLAND Cordage Co., 14th & Northrup Sts., Portland, Ore.

SAMSON Cordage Works, 88 Broad St., Boston, Mass.

SILVER Lake Co., 78 Chauncey St., Boston, Mass.

TRAVES Twine & Cordage Co., 73 Warren St., New York, N. Y.

TUCKER & Carter Rope Co., 167 Maiden Lane, New York, N. Y.

WALL Rope Works, 56 South St., New York, N. Y.

WHITLOCK Cordage Co., 46 South St., New York, N. Y.

CORDS

SEAMING CORDS

MEYER & Co., John C., Lowell, Mass.

CORK

BRAKE AND CLUTCH INSERTS

NATIONAL Brake & Clutch Co., 16 State St., Boston, Mass.
(See page 165.)

Complete Index to Classification appears on Pages 8 to 22.

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UP-TO-THE-MINUTE AUTO SPECIALTIES

"BECCO" TERMINALS

will tell you instantly why a cylinder in your engine has stopped working. They will save you a lot of time and trouble trying to locate the difficulty by locating it for you. The reason they will do this is that they are equipped with a *spark gap* that makes an ignition terminal and spark gap all in one. They cost so little that you can afford to equip your engine with them.

"Becco" Special. Retail price 35c. each.

"Becco" Standard. Retail price 15c. each.

We also manufacture

"BECCO" SPARK PLUGS, BATTERY CONNECTORS, WRENCH SETS, TIRE GRIPS, BATTERY BOXES.

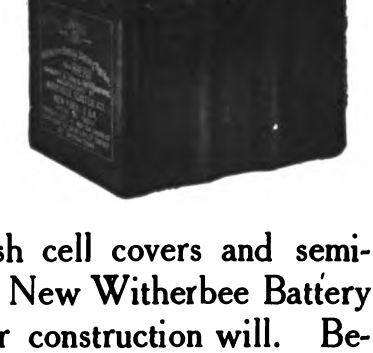
Liberal discounts to Dealers, Jobbers and Manufacturers buying in quantities

THE BECK COMPANY, Rockville Centre, New York

The Only Perfect Battery Construction

in the New

WITHERBEE



THE heavy hard rubber bolted cover takes the strain, splash cell covers and semi-fluid sealing compound make the New Witherbee Battery absolutely acid tight. No other construction will. Besides we give greater capacity in proportion to rating than any other maker. Write us if you seek quality.

WITHERBEE IGNITER COMPANY

SPRINGFIELD, MASS., NEW YORK, CHICAGO AND DETROIT

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COTTON

CALKING COTTON

BOWDEN, Anthony, Cedar Grove, N. J.

MASSASOIT Mfg. Co., Fall River, Mass.

COUNTER-SHAFTS

FINISHED COUNTER-SHAFTS

(For High Wheel Buggies)

ANDERSON Motor Co., 50 W. 16th St., Anderson, Ind.

COVERT Motor Vehicle Co., Lockport, N. Y.

GREENVILLE Metal Products Co., Greenville, Pa.

LEFEVER Arms Co , 1 Maltbie St., Syracuse ,N .Y.
(See page 205.)

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

RUSSEL Motor Axle Co., N. Detroit, Mich.
(See page 489.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

COUPLINGS

HOSE COUPLINGS

(See Clamps, Hose)

PIPE COUPLINGS

(See Fittings, Pipe)

TUBE COUPLINGS

(See Unions, Tubing)

COVERS

AUTOMOBILE COVERS

(For covering automobiles when in the garage)

AMERICAN Karbel Co., Jonesboro, Ark.

FULTON Bag & Cotton Mills, Atlanta, Ga. "Shuredry."

GORDON—See Vehicle Apron & Hood Co.

HOLCOMB Co., New Haven, Conn.

SHUREDRY—See Fulton Bag & Cotton Mills.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn.

BOAT COVERS

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

CARPENTER & Co., Geo. B., 206 S. Water St., Chicago, Ill.

CHICAGO Flag & Decorating Co., 1349 Wabash Ave., Chicago, Ill.

FENTON, David, Manchester, Mass.

HEMMENWAY & Son, 54-55 South St., New York, N. Y.

HOPKINS & Co., John, 119 Chambers St., New York, N. Y.

HUNTER Boat Co., Everett, McHenry, Ill.

KENYON Co., R. L., Waukesha, Wis.

PEASE CO., L. F., Providence, R. I.

RATSEY & Lapthorn, City Island, N. Y.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMAS & Co., Wm. E., 42 South St., New York, N. Y.

LAMP COVERS

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 121.)

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Clark Bldg., Grand Ave. & Washtenaw St., Lansing, Mich.
(See page 641.)

CHICAGO Auto Top Co., 1507 Michigan Ave., Chicago, Ill.

ECONOMY Stay Co., 1017 Lucas Ave., St. Louis, Mo.

EMPIRE Rubber Co., 45 Lafayette St., New York, N. Y.

FALLS City Buggy Top Co., 200 E. Main St., Louisville, Ky.

FEESER Co., Frank S., 1104 Prospect St., Indianapolis, Ind.

GATES-OSBORNE Mfg. Co., 10 S. Second Ave., Marshalltown, Ia.

GIFFORD & Son, John A., 25 Park Place. New York, N. Y. "Tompkins."

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HOPEWELL Bros., 29 Chapel St., Newton, Mass.
(See page 767.)

MONARCH Auto Top & Supply Co., 1461 Michigan Ave., Chicago, Ill.

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

NORRIS Co., R. Milton, 516-18 W. Baltimore St., Baltimore, Md.

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y.
(See page 441.)

RACINE Buggy Top Co., Racine, Wis.

TOMPKINS—See Gifford & Son.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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CORK INSERT CLUTCHES

(PATENTED)

We License Automobile and Parts Manufacturers to Equip Their Clutches with Cork Inserts

Equally Applicable to

Leather Face Cone

Leather Face Cone

[With Supplementary Springs]

Three Plate

Mutiple Disc and

Planetary Clutches

Over 100,000 Now In Use

Leather-Faced Cone with Cork Inserts used by The Pierce-Arrow Motor Car Co., in all "Great Arrow" Motor Cars.

Three-plate Cork Insert Clutch used in all cars manufactured by the Knox Automobile Co.

NATIONAL BRAKE & CLUTCH COMPANY

16 STATE ST.

BOSTON

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COVERS (Continued)

LEATHER MAGNETO COVERS

DETROIT Leather Works, 31-35 Mullett St., Detroit, Mich.
(See page 85.)

ECONOMY Stay Co., 4017 Lucas Ave., St. Louis, Mo.

EUSTICE, Bert M., 54-56 Lafayette Ave., Detroit, Mich.

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

MALCOLM Mfg. Co., 3625-29 Indiana Ave., Chicago, Ill.

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y.
(See page 733.)

MOORE & Steinford, 2317 State St., Chicago, Ill.
(See page 441.)

NORRIS Co., R. Milton, 516-18 W. Baltimore St., Baltimore, Md.

PERKINS-CAMPBELL Co., Cincinnati, O.
(See page 411.)

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y.
(See page 441.)

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

SPRINGFIELD Harness Co., 27-29 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1224 Wabash Ave., Chicago, Ill.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

OIL HOLE COVERS

BAY State Stamping Co., 380 Chandler St., Worcester, Mass. "Bennett," "Handy."

BENNETT—See Bay State Stamping Co.

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y.
(See page 171.)

ELLIOTT Chemical Works, Newton, Mass.

DOEHLER Die-Casting Co., Court & Ninth Sts., Brooklyn, N. Y.
(See page 135.)

HANDY—See Bay State Stamping Co.

TUCKER, W. H. & C. F., Hartford, Conn.
(See page 167.)

WINKLEY Co., Detroit, Mich.
(See page 711.)

PAPER SHIPPING COVERS.

ENTERPRISE Mfg. Co., Indianapolis, Ind.

SEINSHEIMER Paper Co., 1118-22 Bank St., Cincinnati, O.

RADIATOR AND HOOD COVERS

(To prevent the water freezing in cold weather)

CISLER & Serson, 3111 Michigan Ave., Chicago, Ill. "Hobbs."

GILLIAM Mfg. Co., Canton, O.

GORDON—See Vehicle Apron & Hood Co.

HOBBS—See Cisler & Serson.

JACQUES—See Pontiac Auto Accessories Co.

PONTIAC Auto Accessories Co., Osmond Bldg., Pontiac, Mich. "Jacques."

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

RUBBER STEERING WHEEL COVERS OR GRIPS

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

EZE-GRIP—See Hayne-Surridge Auto Goods Co.

GORDON—See Vehicle Apron & Hood Co.

HAYNE-SURRIDGE Auto Goods Co., 1017 Lucas Ave., St. Louis, Mo. "Eze-Grip."

PARKER-STEARNS & Co., 286 Sheffield Ave., Brooklyn, N. Y.

VEHICLE Apron & Hood Co., Columbus, O "Gordon."

SEARCHLIGHT, BINNACLE, SKY-LIGHT AND WHEEL COVERS

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

PEASE Co., L. F., Providence, R. I.

RATSEY & Lapthorn, City Island, N. Y.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

STARTING CRANK COVERS

(See Holders, Starting Crank)

STEERING KNUCKLE COVERS

(See Boots, Steering Knuckle)

TIRE COVERS

(See Cases, Tire and Tube)

TOP COVERS

(See also Tops, Automobile)

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Clark Bldg., Grand Ave. and Washtenaw St., Lansing, Mich.
(See page 641.)

FALLS City Buggy Top Co., 200 E Main St., Louisville, Ky.

GATES-OSBORNE Mfg. Co., 10 S. Second Ave., Marshalltown, Ia.

GILLIAM Mfg. Co., Canton, O.

GORDON—See Vehicle Apron & Hood Co.

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TUCKER POSITIVE LOCK COMPRESSION GREASE CUPS

No. 000—¾"

Pat. Jan. 11th, 1910

NO FRICTION BUT THE GREASE

COMPRESSION APPLIED WITH THE FINGERS. NO SPRINGS AND WASHERS TO DEPRESS WHEN FEEDING THE LUBRICANT

Heads cannot jar off from vibration; always locked; (no ratchet or springs exposed to grease and dirt); all locking parts enclosed; base and head built low, no higher above thread than ordinary plain grease cup; locking mechanism mounted on top of head manually operated; push small cap down, turn to right to stop; *unlocked for compression.* If left unlocked, **is self-locking** on quarter turn when head starts to unscrew. To re-fill: turn small cap to left to stop, remove large head, turn lock to right to assemble.

MADE IN THREE SIZES—¾", 1" AND 1¼"

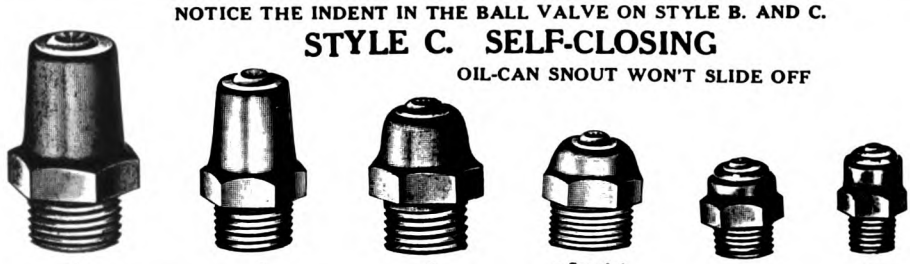
Catalog tells more. Want one? Write to-day.

TUCKER OIL HOLE COVERS

NOTICE THE INDENT IN THE BALL VALVE ON STYLE B. AND C.

STYLE C. SELF-CLOSING

OIL-CAN SNOUT WON'T SLIDE OFF



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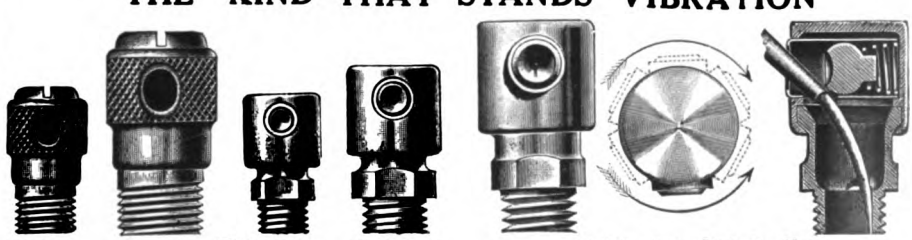

Style A—No. 2 | Style A—No. 4 | Style B—No. 3 | Style B—No. 4 | Self-Closing—Style B—No. 5 Showing exterior and interior

Send for Catalog of full line

W. H. & C. F. TUCKER, Hartford, Conn.

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COVERS (Continued)

TOP COVERS (Continued)

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.
(See page 435.)

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

SPRINGFIELD Auto Top & Upholstering Co., 102-06 Dwight St., Springfield, Mass.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco."
(See page 433.)

VESCO—See Vehicle Top & Supply Co.

CRANKSHAFTS

FINISHED OR MACHINED CRANKSHAFTS

(For Crankshafts in the rough—See Forgings, Drop)

ATLAS Mfg. Co., Fostoria, O.
(See page 601.)

AUTO Crank Shaft Co., 196 Piquette Ave., Detroit, Mich.

AUTO Parts Mfg. Co., Detroit, Mich.
(See page 773.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

FORE River Shipbuilding Co., Quincy, Mass.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 601.)

HASTINGS Motor Shaft Co., Hastings, Mich.

JOLIET Forge Co., Joliet, Ill.

KRUPP—See Prosser & Son.

LANSING Grinding Co., Lansing, Mich.

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass.

MICHIGAN Crankshaft Co., Muskegon, Mich.
(See page 611.)

MUSKEGON Motor Specialties Co., Water St., Muskegon, Mich.
(See page 409.)

NATIONAL Engineering Co., Saginaw, Mich.

NORTON Grinding Co., Worcester, Mass.

OBENBERGER Drop Forge Co., 220 Lake St., Milwaukee, Wis.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 607.)

SUNDBERG-KROPP & Co., 2510 W. 21st St., Chicago, Ill.

TINDEL-MORRIS Co., Eddystone, Pa.

WITTEMAN Co., A. P., 112-16 N. Broad St., Philadelphia, Pa.
(See page 489.)

WYMAN & Gordon Co., Worcester, Mass.
(See page 169.)

CRANKS

SAFETY STARTING CRANKS

HILTON Mfg. Co., 9 Calender St., Providence, R. I.

JONES & Williams, Plainville, Conn.

KEYSTONE Safety Starting Handle Co., 411 Walnut St., Philadelphia, Pa.

LLOYD & Inman, Fremont, O.

MOTOR Safety Crank Co., 1777 Broadway, New York, N. Y. "Nokik."

NOKIK—See Motor Safety Crank Co.

SNOW & Petrelli Mfg. Co., 152 Brewery St., New Haven, Conn.

CUPS

BALL CUPS AND CONES

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 269.)

BAUER Machine Co., Jeffersonville, Ind.

BOSSERT Co., Utica, N. Y.
(See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

DETROIT Screw Works, Detroit, Mich.
(See page 739.)

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co. Elyria, O.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

MOTOR CYCLE BALL CUPS AND CONES

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

DETROIT Screw Works, Detroit, Mich
(See page 739.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

REESE Machine & Tool Works, 224-30 W. Main St., Plymouth, Pa.

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CUPS (Continued)

OIL AND GREASE CUPS

(See also Lubricators; also Covers, Oil Hole)

ACTIVE—See Sherman Mfg. Co.

ALBANY Lubricating Co., 313 West St., New York, N. Y. (Grease Cups only.)

ALLEN Mfg. Co., W. D., 151-53 Lake St., Chicago, Ill.

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

AMERICAN Lubricator Co., 93 Catherine St., Detroit, Mich.

BAY State Stamping Co., 330 Chandler St., Worcester, Mass.

BESLY & Co., Chas. H., Chicago, Ill. "Helmet."
(See page 491.)

BOWEN Mfg. Co., 16 Canal St., Auburn, N. Y. "Empress."
(See page 171.)

CAMDEN—See Lindholm Metal Stamping Co.

CHICAGO—See Ohio Injector Co.

COLONIAL—See Powell Co.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

DOEHLER Die-Casting Co., Court & Ninth Sts., Brooklyn, N. Y.
(See page 135.)

EMPRESS—See Bowen Mfg. Co.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

GUARDIAN—See Sherman Mfg. Co.

HELMET—See Besly & Co.

IDEAL—See Lunkenheimer Co.

IMPERIAL Brass Mfg. Co., 446 S. Jefferson St., Chicago, Ill.
(See page 153.)

JOSEPH—See Lindholm Metal Stamping Co.

KELLY & Jones Co., Greensburg, Pa.

LINDHOLM Metal Stamping Co., 111 Erie St., Camden, N. J. "Joseph." "Vale," "Camden," "Madeira," "McKee."
(See page 171.)

LION—See Lunkenheimer Co.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O. "Ideal," "Lion," "Pioneer," "Royal," "Sentinel," "Tiger."

McKEE—See Lindholm Metal Stamping Co.

McRAE & Roberts Co., 227-35 Campbell Ave., Detroit, Mich.

MADEIRA—See Lindholm Metal Stamping Co.

MASCOT—See Powell Co.

MECCA—See Powell Co.

MECHANICAL & Electrical Mfg. Co., A R 2227 Prairie Ave., Chicago, Ill.
(See page 249.)

MERCHANT & Evans Co., 517 Arch St., Philadelphia, Pa.

MERRY, Edward, 395 Allen St., Springfield, Mass.

MICHIGAN Lubricator Co., 661-73 Beaubein St., Detroit, Mich.

MIKADO—See Powell Co.

MILWAUKEE Valve Co., 871-83 Robinson Ave., Milwaukee, Wis.

MOGUL—See Powell Co.

OHIO Injector Co., Wadsworth, O. "Chicago."

OMEGA—See Tell City Foundry & Machine Works.

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

PERFECT—See Sherman Mfg. Co.

PHILLIPS Co., 35-37 Skilton Ave., Somerville, Mass.

PIONEER—See Lunkenheimer Co.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O. "Mogul," "Progress," "Renown," "Vanguard," "Colonial," "Mecca," "Mikado," "Mascot."

PREMIUM—See Sherman Mfg. Co.

PROGRESS—See Powell Co.

RENOWN—See Powell Co.

ROYAL—See Lunkenheimer Co.

SENTINEL—See Lunkenheimer Co.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich. "Premium," "Perfect," "Guardian," "Active."

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

SOUTH Park Mfg. Co., Port Huron, Mich.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TELL City Foundry & Machine Works, Tell City, Ind. "Omega."

THEIM—See Winkley Co.

TIGER—See Lunkenheimer Co.

TUCKER, W. H. & C. F., Hartford, Conn.
(See page 167.)

UNIVERSAL Lubricator Co., 1337 Arch St., Philadelphia, Pa.

VALE—See Lindholm Metal Stamping Co.

VANGUARD—See Powell Co.

WALWORTH Mfg. Co., Boston, Mass.
(See page 571.)

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., 904 Sycamore St., Cincinnati, O.

WINKLEY Co., Detroit, Mich. "Theim."
(See page 711.)

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

SPRING KEY PRIMING CUPS

(For Ordinary Priming Cups—See Cocks, Standard Pet

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

DURTOUT—See Duryea, Chas. E.

DURYEA, Chas. E., Reading, Pa. "Durtout."

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

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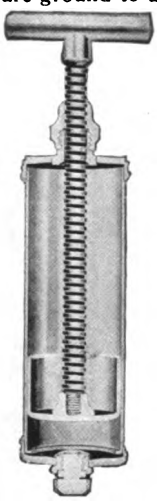
"B"-LINE ALL-METAL OIL-GREASE GUNS

"The Handy Devices for Unhandy Places."

Never leak—because metal plungers are ground to a perfect fit.



Never get out of order—because there is nothing about them that can get out of order.

"Boston Combination"

This is the gun shown in the cut. It handles gasoline, light oil, heavy oil, non-fluid oil or the heaviest grease with equal facility.

PRICE OF EACH:

1-ounce	$2.25
3 "	2.50
5 "	3.00
8 "	3.50
10 "	4.00
14 "	4.50
18 "	5.00

Finish—polished brass—lacquered.

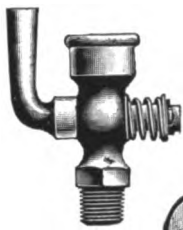
Equipment:
Oil Tip—Grease Tip and Plug for Closing.

We make other B-Line guns for one and two-hand manipulation.

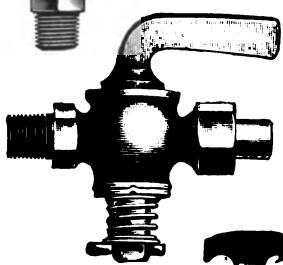
Send for Booklet A.

The Randall-Faichney Co.
BOSTON, U. S. A.

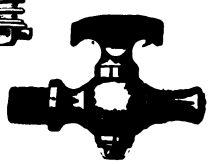
Brass Engine Fittings



All Designs
Priming Cups
Gasoline Cocks
Air Cocks
Pet Cocks



Brass
Castings
Machine Work
Stampings
Spinning
Tube Bending



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Tribune Building
NEW YORK CITY

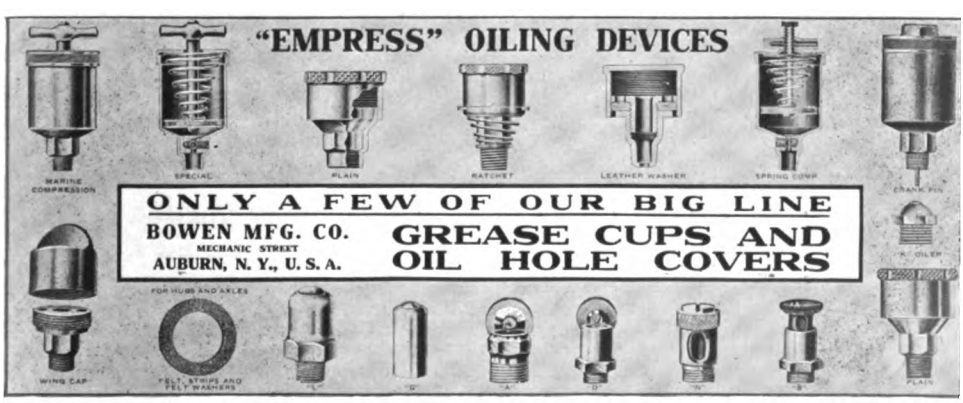
LINDHOLM METAL STAMPING CO., Inc.

Die making a specialty. Light and heavy press work. Dies designed to reduce operations. Automobile stampings. Drawn metal grease cups a specialty.

Manufacturers of the "JOSEPH" Positive Lock Automobile Cup

Write for Booklet and Prices.

111 ERIE STREET, CAMDEN, N. J.



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CUPS (Continued)

SPRING KEY PRIMING CUPS

(Continued)

LUNKENHEIMER Co., 228 E. Eighth St., Cincinnati, O.

PRICE & Co., C. B., Tribune Bldg., New York, N. Y. (Dealers.)
(See page 171.)

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis.

STANDARD Brass Works, 528 Woodbridge St., E. Detroit, Mich.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

CURTAINS

MOTOR BOAT CURTAINS

ABERCROMBIE Co., David T., 311 Broadway, New York, N. Y.

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

CURTAIN Supply Co., 320 W. Ohio St., Chicago, Ill.

FOGG, M. W., 202 Front St., New York, N. Y.

MESSINGER, W. D., 394 Boylston St., Boston, Mass.

PEASE Co., L. F., Providence, R. I.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMAS & Co., Wm. E., 42 South St., New York, N. Y.

CUSHIONS

MOTOR BOAT CUSHIONS AND MATTRESSES

ATLANTIC Co., Amesbury, Mass.

BIRNS, Wm., 70 W. 38th St., New York, N. Y.

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

CARPENTER & Co., Geo. B., 206 S. Water St., Chicago, Ill.

CENTRAL Lake Boat Mfg. Co., Central Lake, Mich.

CHICAGO Flag & Decorating Co., 1349 Wabash Ave., Chicago, Ill.

ENNIS, W. G., 15 Hayne St., Charleston, S. C.

FOGG, M. W., 202 Front St., New York, N. Y.

FRANK, W. H., 22-24 Harrison St., New Rochelle, N. Y.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

HUNTER Boat Co., Everett, McHenry, Ill.

KENYON Co., R. L., Waukesha, Wis.

LONGDIN-BRUGGER Co., Fond-du-Lac, Wis.

MESSINGER, W. D., 394 Boylston St., Boston, Mass.

OSTERMOOR & Co., 116 Elizabeth St., New York, N. Y.

PEASE Co., L. F., Providence, R. I.

RADERMACHER, John L., 16 Horatio St., New York, N. Y.

SAMMET & Son Co., G. W., 2 Atlantic Ave., Boston, Mass.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMPKINS & Co., John W., 46-48 14th St., Hoboken, N. J.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich.

MOTOR BOAT PNEUMATIC CUSHIONS AND MATTRESSES

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

METROPOLITAN Air Goods Co., Reading, Mass. "Zephyr."

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

ZEPHYR—See Metropolitan Air Goods Co.

SPECIAL SEAT CUSHIONS

(For Ordinary Cushions—See Bodies; also Tops)

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

VENTILATED Cushion & Spring Co., Jackson, Mich.

CYLINDERS.

FINISHED OR MACHINED CYLINDERS

(For Cylinder Castings in the Rough—See Castings, Gray Iron)

ERIE Foundry Co., 12th & Cranberry Sts., Erie, Pa.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 581 and 584.)

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

MUNCIE Foundry & Machine Co., Muncie, Ind.
(See page 675.)

DASHES

LEATHER DASHES

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

SNOW-MOSS Co., 127 W. 49th St., New York, N. Y.

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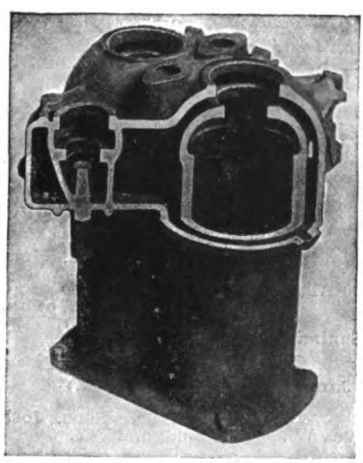
There is no room for argument

Price should not enter into the purchase of cylinder castings. The main problem is to secure not merely good castings, but the best castings obtainable. Cylinders are the one part where no chance may be taken; no element of uncertainty find room. Castings MUST be perfect, else care and perfection in everything else count for naught.

WE ARE CASTINGS SPECIALISTS

We have been making automobile castings, hundreds of thousands of them, for America's leading car makers, ever since the inception of the automobile industry. Our formulas are fixed and unvarying; our castings are as nearly flawless as human skill and care can make them. Defects are guarded against with every precaution that experience dictates and rigid inspection provides.



Increased capacity permits of our taking on a limited number of high-class accounts.

Our guarantee is perfect castings and deliveries according to contract.

Manufacturers Foundry Co.
WATERBURY, CONN.

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DASHES (Continued)

METAL DASHES

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AEPINUS-HAGGSTROM Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See pages 94 and 95.)

KINSEY Mfg. Co., Toledo, O. (See page 383.)

MULLINS Co., W. H., 182 Franklin St., **Salem, O.**

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 172d St., New York, N. Y.

STOLL Pressed Steel Co., Buffalo, N. Y.

WOOD DASHES

ACME Veneer & Body Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 91.)

DANN Bros. & Co., 30-33 Franklin St., New Haven, Conn.

EBY Auto Parts Co., 470 Lawton Ave., Detroit, Mich. (See page 687.)

EGGERS Veneer Seating Co., F., Two Rivers, Wis.

HANSON-WARD Veneer Co., Bay City, Mich. (See page 439.)

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

HERZOG Art Furniture Co., Saginaw (W. S.), Mich.

JAMESTOWN Panel & Veneer Co., Jamestown, N. Y.

KELSEY-HERBERT Co., 570 Kirby Ave., W., Detroit, Mich.

KUNDTZ, Theo., Cleveland, Ohio.

LA PORTE Carriage Co., La Porte, Ind. (See page 735.)

STANDARD Cabinet Mfg. Co., Peru, Ind.

WAYNE Cabinet Co., Detroit, Mich.

WIDMAN & Co., J. C., 14th, 15th Sts. & G. T. Ry., Detroit, Mich.

WISCONSIN Lumber & Veneer Co., Port Washington, Wis.

DAVITS

ANCHOR DAVITS

MERRIMAN Bros., 185 Amory St., Boston, Mass.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOOD & Chute Machine Co., Greenport, N. Y.

BOAT DAVITS

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

MERRIMAN Bros., 185 Amory St., Boston, Mass.

WELIN Davit & Lane & DeGroot Co., 305-15 Vernon Ave., Long Island City, N. Y.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOOD & Chute Machine Co., Greenport, N. Y.

DISCS

RADIATOR DISCS OR FINS

BLISS-CHESTER Co., Providence, R. I. (See page 421.)

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

STEEL CLUTCH DISCS

ATKINS & Co., E. C., South & Illinois Sts., Indianapolis, Ind.

BARRY Saw Co., 228 S. Penn St., Indianapolis, Ind.

BOSSERT Co., Utica, N. Y. (See page 755.)

CROSBY Co., Buffalo, N. Y. (See page 227.)

DISSTON & Sons, Henry (Tacony), Philadelphia, Pa.

HUTHER Saw Works, Rochester, N. Y. (See page 555.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

OLDHAM & Sons, Joshua, 112-30 26th St., Brooklyn, N. Y.

SIMONDS Mfg. Co., North St., Fitchburg, Mass.

STOLL Pressed Steel Co., Buffalo, N. Y.

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(See Timers, Ignition)

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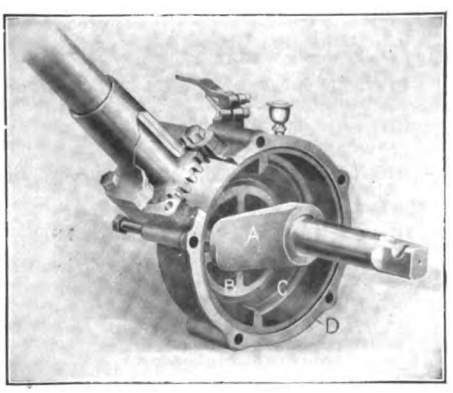

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ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

GOOD-GRIP Co., Harrisburg, Pa.

OWL—See Western Chemical Mfg. Co.

RIE-NIE Mfg. Co., 919 First Ave. S., Minneapolis, Minn. (See page 331.)

VICTOR Clutch Compound Co., Nashua, N. H.

WESTERN Chemical Mfg. Co., 208 Fourth St., Milwaukee, Wis. "Owl."

LEATHER DRESSING

ANDERSON Varnish Co., 3214 Sheffield Ave., Chicago, Ill.

AQUILA Chemical Co., 1707½ Fond du Lac Ave., Milwaukee, Wis.

BILLINGS-CHAPIN Co., Cleveland, O.

BUFFALO Specialty Co., 375 Ellicott St., Buffalo, N. Y. "Peerless."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

CUMMER Products Co., 2993 E. 34th St., Cleveland, O. **"Perfect Auto Gloss."**

DETROIT Varnish Co., Milwaukee St. & Widman Pl., Detroit, Mich. "Rogers."

DIX Mfg. Co., Lewistown, Pa.

ENAMELAC Varnish Co., 126 Main St., Racine, Wis.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

HAUTHAWAY & Sons, C. L., 346 Congress St., Boston, Mass.

JEWELL Mfg. Co., 21st St. & Marshall Blvd., Chicago, Ill. "Nelson's."

KING—See Chicago White Lead & Oil Co.

LYONS & Son, 493 Union St., Lynn, Mass. "Sombrekol," "Salamka," "Sabiska." (See page 387.)

McDOUGALL Varnish Co., Buffalo, N. Y.

MAT'S—See Weiss Polish Works.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

MONTGOMERY-WASHBURN Co., Saugerties, N. Y.

NELSON'S—See Jewell Mfg. Co.

PEERLESS—See Buffalo Specialty Co.

PERFECT AUTO GLOSS—See Cummer Products Co.

R-N Leather Dressing Co., Pawtucket, R. I.

RIE-NIE Mfg. Co., 919 First Ave. S., Minneapolis, Minn. (See page 331.)

ROGERS—See Detroit Varnish Co.

ROYAL Dressing & Polish Co., 11 W. Chicago Ave., Chicago, Ill.

ROYAL Leather Color Co., 62 Pearl St., Buffalo, N. Y.

SABISKA—See Lyons & Son.

SALAMKA—See Lyons & Son.

SCHMOEGER, Frederic A., Sterling, Ill.

SOMBREKOL—See Lyons & Son.

WEISS Polish Works, Chicago, Ill. "Mat's." (See page 655.)

WEISS & Son, Chas., 4801 Cottage Grove Ave., Chicago, Ill.

WEST Mfg. Co., 119 N. Madison St., Rockford, Ill.

ZINSSER & Co., W., 195 William St., New York, N. Y.

DRILLS

MOTOR CYCLE BELT DRILLS AND PUNCHES

MAJESTIC Mfg. Co., 34 Southbridge St., Worcester, Mass.

WIDMAYER & Co., Frank B., 2312 Broadway, New York, N. Y.

DRUMS

PRESSED STEEL BRAKE DRUMS

(For Cast Drums—See Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y. (See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CROSBY Co., Buffalo, N. Y. (See page 227.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 227.)

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 99.)

HYDRAULIC Pressed Steel Co., Cleveland, O. (See inside back cover.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KINSEY Mfg. Co., Toledo, O. (See page 383.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

SMITH Co., A. O., Milwaukee, Wis. (See page 397.)

STOLL Pressed Steel Co., Buffalo, N. Y.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

DUSTERS

MOTORISTS DUSTERS

(See Clothing, Motorists)

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C & C—See Garwood Electric Co.

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ECK Dynamo & Motor Co., Belleville, N. J.

ENGINEERING Specialty Co., Stamford, Conn.

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FORT WAYNE Electric Works, Fort Wayne, Ind.

GARWOOD Electric Co., Garwood, N. J. "C & C."

GENERAL Electric Co., Schenectady, N. Y.

HOLTZER-CABOT Electric Co., Boston, Mass.
(See page 413.)

KENDRICK & Davis Co., Lebanon, N. H.

L.-N.—See Leece Neville Co.

LAMB Electric Co., 20 Huron St., Grand Rapids, Mich.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L.-N."

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

PEERLESS Electric Co., Warren, O.

PHOENIX Electric Co., Mansfield, O.

ROBBINS & Myers Co., Lagonda Ave., Springfield, O.

ROTH Bros. & Co., 1375 W. Adams St., Chicago, Ill.

SPRAGUE Electric Co., 527 W. 34th St., New York, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

ELECTRIC LIGHTING AND BATTERY CHARGING DYNAMOS

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake-Newbold."

ADLAKE-NEWBOLD—See Adams & Westlake Co.

AMERICAN Mfg. Co., Meriden, Conn.
(See page 639.)

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 639.)

DUPLEX Electric Co., 13 McWilliams St., Fond-du-Lac, Wis.
(See page 771.)

DYNETO Electric Co., Elbridge, N. Y.
(See page 415.)

ECONOMY Mfg. Co., 418 Park Bldg., Pittsburg, Pa.

ELBA—See Weiland Storage Battery Co.

ELECTRIC Auto-Liter Co., South Bend, Ind.

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y.
(See page 653.)

GRAY & Davis, Amesbury, Mass.
(See page 255.)

HARTMAN Electrical Mfg. Co., Mansfield, O.

HOLTZER-CABOT Electric Co., Boston, Mass.
(See page 413.)

KINLEY Mfg. Co., Hoyne Ave. & Van Buren St., Chicago, Ill.

KNOP Battery Co., 60 Atwater St. E., Detroit, Mich. "Wizard."
(See page 413.)

LEONARD Electric Co., Ward, Bronxville, N. Y.

NORTH East Electric Co., 348 Whitney St., Rochester, N. Y.

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

WILLARD Storage Battery Co., **Marquette & Lakeside Aves., Cleveland, O. "Elba."**

WIZARD—See Knop Battery Co.

IGNITION DYNAMOS

(See Magnetos, Ignition)

ECONOMIZERS

FUEL ECONOMIZERS AND FUEL MIXERS OR AGITATORS

BAUMS Brass & Model Works, Minneapolis, Minn.

G-L Economizer Co., 3 Ann St., New York, N. Y.

GARLOCK Auto Specialty Co., **50 Main St.,** Palmyra, N. Y. "Whiting."

GYREX Mfg. Co., 1777 Broadway, New York, N. Y.

HOMO Co. of America, 68 Hudson St., Jersey City, N. J.
(See page 179.)

JACOBS, S. R., 18 Broadway, New York, N. Y. "Stellaflo."

MORGAN—See Pioneer Iron Works Co.

PIONEER Iron Works Co., Antigo, Wis. "Morgan."

RAIMES & Co., New York, N. Y. "Spider."

SPIDER—See Raimes & Co.

STELLAFLO—See Jacobs, S. R.

STEWART Machine Works, Alfred C., 1008 Santee St., Los Angeles, Cal.

WHITING—See Garlock Auto Specialty Co

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The more thorough the evaporation of the gasoline spray, the more easily is the air carburetted; and the more even the distribution of the gasoline in the carburetted air, the greater the efficiency of the explosion.

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The HOMO consists of a housing or casing so constructed as to be inserted between the carbureter and the intake manifold of the engine. Inside of this housing is a mesh wheel which revolves upon annular ball bearings.

This wheel is composed of fan blades and wire mesh of a given degree of coarseness.

The mixture of gasoline spray and air in the carbureter is drawn by the engine through this mesh-fan-wheel.

The fan blades cause the wheel to revolve at high speed, and the mixture must pass through the flying mesh, which, by violent impact, breaks up the particles of gasoline and enforces evaporation. In the consequent agitation, the air becomes evenly carburetted with this evaporated gasoline.

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LESS GASOLINE AND LESS HEAT—25 TO 50 PER CENT.
The excess of gasoline required, where the carburetting is not thoroughly and homogeneously accomplished, cuts down the power and causes heat because of slower expansion due to slower combustion. This is eliminated.

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(See Fittings, Pipe)

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BINNS Chemical Works, 164 Front St., New York, N. Y.

CONTACT Process Co., Abbott Rd., Buffalo, N. Y.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 641.)

SHOLES Co., Charles E., 164 Front St., New York, N. Y.

ENAMELS

AUTOMOBILE ENAMELS

(See Paints, Enamel)

ENGINES

GASOLINE ENGINES

(See Motors, Gasoline)

KEROSENE ENGINES

(See Motors, Kerosene)

STEAM AUTOMOBILE ENGINES

DIETER Steam Engine Co., 123 Liberty St., New York, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

WALKER Mfg. Co., E. C., Jackson & Lampton Sts., Louisville, Ky.

EXTINGUISHERS

FIRE EXTINGUISHERS

ACCURATE—See Tea Tray Co.

ATLAS Mfg. Co., 129 Reade St., New York, N. Y. "Quick Out."

BADGER Chemical Mfg. Co., 148 Reed St., Milwaukee, Wis. "Mitchell," "Copper King."

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BOYD & Bro., James, North American Bldg., Philadelphia, Pa. "Keystone," "Paragon."

BUCKLAND Fire Extinguisher Co., 575 Lyell Ave., Rochester, N. Y.

CHILDS Co., O. J., Utica, N. Y. "Utica."

COPPER KING—See Badger Chemical Mfg Co.

ECLIPSE—See Haverhill Fire Appliance Co.

EVER Ready Mfg. Co., 44-46 Pearl St., Buffalo, N. Y.

FYRICIDE Mfg. Co., 34 Murray St., New York, N. Y.

GOODSON Electric & Mfg. Co., Providence, R. I.

GRUBB, Charles Edmund, 819 Fourth Ave., Altoona, Pa. "Reliance."

HARRIS Fire Apparatus Co., 34 E. 23d St., New York, N. Y.

HAVERHILL Fire Appliance Co., 40 Merrimack St., Haverhill, Mass. "Eclipse."

HAYWARD & Co., S. F., 39 Park Pl., New York, N. Y.

HOME Chemical Co., Rochester, N. Y.

J. M.—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J. M."

JOLIET—See Wilcox Co.

KEYSTONE—See Boyd & Bro.

KILFYRE, Inc., 83 Warren St., New York, N. Y.

LIBERTY Mfg. Association, Huron & Franklin Sts., Chicago, Ill.

LIQUID Carbonic Co., 432 Wells St., Chicago, Ill. (See page 417.)

MARTEN—See Tea Tray Co.

MINIMAX Co., 198 W. Broadway, New York, N. Y.

MITCHELL—See Badger Chemical Mfg. Co.

NEVERMYSS Fire Extinguisher Co., Middletown, N. Y.

PARAGON—See Boyd & Bro.

PHOENIX Fire Appliance Co., 45 W. 34th St., New York, N. Y.

PYRENE Mfg. Co., 410 E. 32d St., New York, N. Y.

QUICK OUT—See Atlas Mfg. Co.

RELIANCE—See Grubb, Charles Edmund.

REX Fire Appliance Co., 72-76 Cortlandt St., New York, N. Y.

ROCKFORD - KALAMAZOO Fire Extinguisher Co., State & Main Sts., Rockford, Ill.

SALMON & Co., Hamilton H., 38 Wall St., New York, N. Y.

STEMPEL Fire Extinguisher Co., 4250 N. 20th St., St. Louis, Mo.

TEA Tray Co., Newark, N. J. "Accurate," "Marten."

UNITED Mfg. Co., Leipsic, O.

UTICA—See Childs Co.

WILCOX Co., Chas. C., 115-27 Cass St., Joliet, Ill. "Joliet."

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SCREW EYES

(See Screw Eyes)

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CONOVER Co., C. F., 101 Franklin St., New York, N. Y. "Naiad."

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

H. M. H Mills, 1 Union Sq. W., New York, N. Y.

NAIAD—See Conover Co.

PENACLOTH—See Pennsylvania Rubber Co.

PENNSYLVANIA Rubber Co., Jeannette, Pa. "Penacloth"
(See page 663.)

STEVENS, Leo, Madison Sq., New York, N. Y. (Importer.)

FANS

RADIATOR FANS

(See also Radiators)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

CHANDLER Radiator Co., 177 High St., E. Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

KONIGSLOW Mfg. Co., Otto. Cleveland, O.
(See page 671.)

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

O-C—See Oakes & Co.

OAKES & Co., W. H., K. of P. Bldg., Indianapolis, Ind. "O. C."

PENDLETON Novelty Mfg. Co., Pendleton, Ind.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich.
(See page 574.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

FASTENERS

CURTAIN FASTENERS

ANDERSON Electric Machine Tool Co., 1113 Cass Ave., St. Louis, Mo.

AUBURN Machine Works, 290 Auburn Ave., Buffalo, N. Y. "Challenge."

BREWSTER—See Cowles & Co.

BROGA Automatic Fastener Co., 368 W. Fayette St., Syracuse, N. Y.
(See page 183.)

CARR Fastener Co., 145 High St., Boston, Mass.

CHALLENGE—See Auburn Machine Works.

COWLES & Co., C., New Haven, Conn. "Brewster," "Excelsior," "Ideal," "Perfect," "Success."
(See page 351.)

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer," "Premier."

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

ENGLISH & Mersick Co., New Haven, Conn.

EXCELSIOR—See Cowles & Co.

GOSHEN Eyelet Co., Goshen, Ind.

HERSHEY Hook Co., Lincoln, Neb.

HIGGIN Mfg. Co., Newport, Ky.
(See page 183.)

IDEAL—See Cowles & Co.

JITSU—See L. & D. Mfg. Co.

JONAH & George, Merrimac, Mass.

L. & D. Mfg. Co., 86-90 Broad St., Boston, Mass. "Jitsu."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

NEIDER Co., F. A., Augusta, Ky. "Peerless."
(See page 183.)

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

PEERLESS—See Neider Co.

PERFECT—See Cowles & Co.

PIONEER—See Crandal, Stone & Co.

PREMIER—See Crandal, Stone & Co.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

STRONG, M H., 168 South Ave., Rochester, N. Y.
(See page 439.)

SUCCESS—See Cowles & Co.

UNITED States Fastener Co., 95 Milk St., Boston, Mass.
(See page 183.)

WEISS & Son, Chas., 4801 Cottage Grove Ave., Chicago, Ill.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOODRUFF & Sons Co., Walter W., Mt Carmel, Conn.

HOOD FASTENERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

ENGLISH & Mersick Co., New Haven, Conn

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

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Add refinement and distinctiveness to your product

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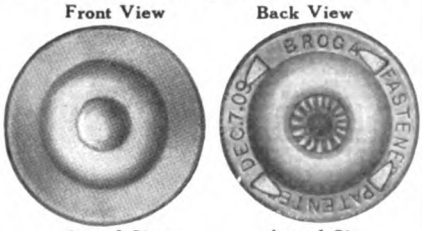

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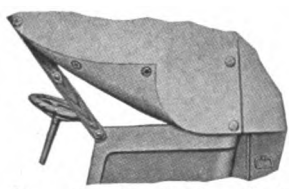
Augusta, Ky.

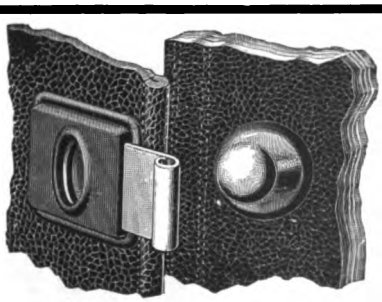
FASTENERS



Represented at
New York, N. Y.
450 Broome St.
Chicago, Ill.
237 Fifth Ave.

Of Every Size and Style. Used on all the Leading Cars. Prompt Deliveries in any Quantity. Write for Prices.

United States Fastener Company
Manufacturers of Snap Fasteners and Metal Goods
95 Milk Street, Boston, Mass.



"The" Curtain Fastener

is a secure and positive fastener. The slide locks it tight and it cannot shake loose. Easily operated. Send for complete list of this and many other specialties.

THE HIGGIN MFG. CO., Newport, Ky.

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FASTENERS (Continued)

HOOD FASTENERS (Continued)

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

MOTOR CYCLE BELT FASTENERS

MAJESTIC Mfg. Co., 34 Southbridge St., Worcester, Mass.

FENDERS

MOTOR BOAT FENDERS

ARMSTRONG Cork Co., Pittsburg, Pa.

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

WEEKS-HOWE-EMERSON Co., 51 Market St., San Francisco, Cal.

MUD FENDERS

(See Guards, Mud)

FIBRE

HARD FIBRE

(Sheet, Rod and Tube)

AMERICAN Vulcanized Fibre Co., Equitable Bldg., Wilmington, Del.

CONCRETE Fibre Co., Ford & Lafayette Sts., Norristown, Pa.

CONTINENTAL Fibre Co., Newark, Del.
(See page 185.)

DELAWARE Hard Fibre Co., Wilmington, Del.

DIAMOND State Fibre Co., Elsmere, Del.

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y.
(See page 185.)

NATIONAL Fibre & Insulation Co., Yorklyn, Del.

STANDARD Fibre Co., Miller St., Somerville, Mass.

WILMINGTON Fibre Specialty Co., Wilmington, Del.
(See page 185.)

FILLERS

PAINT FILLERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

BRIDGEPORT Wood Finishing Co., New Milford, Conn.

CAWN Mining & Mfg. Co., Canton, O.

CELOX—See Valentine & Co.

CHASE, Roberts & Co., West Ave., Fifth & Sixth Sts., Long Island City, N. Y.

CINCINNATI Color Co., Eighth & Evans Sts. Cincinnati, O.

FLOOD & Conklin Co., 136 Chestnut St. Newark, N. J.

HEATH & Milligan Mfg. Co., 170 Randolph St., Chicago, Ill.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

JOHNSTON Paint Co., 226 Main St., Cincinnati, O. "Krakno."

KEENE-PEASLEE Co., Amesbury, Mass. **Nelsons."**

KEYSTONE Paint & Filler Co., Muncy, Pa.

KRAKNO—See Johnston Paint Co.

MASURY & Son, John W., New York, N. Y.
(See page 453.)

MOLLER & Schumann Co., New York, N. Y.
(See page 311.)

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

NELSONS—See Keene-Peaslee Co.

NICE, Eugene E., 272 S. Second St., Philadelphia, Pa.

PHOENIX Paint & Varnish Co., 124 Market St., Philadelphia, Pa.

RENO Bros. Paint Co., Pulaski, Pa.

ST. Louis Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo.

SMITH & Co., Edward, Sixth St. & West Ave., L. I. City, N. Y.

VALENTINE & Co., 257 Broadway, New York, N. Y. "Celox."

VESTAL Paint Co., Vestal, N. Y.

WILHELM Co., A., Reading, Pa.

SEAM FILLERS

KUHLS, H. B. Fred, 23d St. & Third Ave., Brooklyn, N. Y.

WOOLSEY Paint & Color Co., C. A., Jersey City, N. J.

FILTERS

OIL FILTERS

AL-TON Motor Accessory Co., South & High Sts., Akron, O.
(See page 201.)

FINS

RADIATOR FINS

(See Discs, Radiator)

Complete Index to Classification appears on Pages 8 to 22.

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OUR

VULCANIZED FIBRE

costs you no more than any other, and it presents the advantage of a uniform and high grade material.

Special shapes to exact gauge.

Immediate deliveries regardless of quantity.

THE CONTINENTAL FIBRE COMPANY, NEWARK, DEL.

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IN ALL FORMS

Brake Bands, Washers, Cleats, Timer Rings, Spark Coil Covers

We wish to emphasize the great advantages of HARD FIBRE TUBING for carrying the ignition cables in motor cars. We make a special design of tubes for this purpose. Write us for prices.

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UNEXCELLED FOR STRENGTH

PYRALIN

TRANSPARENT

SHEETING

UNEXCELLED FOR CLEARNESS

Sizes of sheets: 20 in. x 36 in. and 20 in. x 50 in. in any desired thickness

FLEXIBLE, WATER AND WEATHER PROOF

Better Than Glass for Auto and Buggy Tops, Storm Fronts, Hoods, etc.

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Rods, Tubes, Sheets, Washers, Brake Bands, Friction Bands, Cleats, Insulators, Gaskets, Bushings, Gears, Etc.

We have made a specialty of Automobile work
Send us your specifications for prices

Wilmington Fibre Specialty Co.

Wilmington, Delaware

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New York, Chicago, Cleveland, St. Louis, Detroit, Pittsburgh

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FITTINGS

AWNING FITTINGS

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

MARINE Hardware Co., Peabody, Mass.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOOD & Chute Machine Co., Greenport, N. Y.

BATH ROOM FITTINGS

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

MANNING, Bowman & Co., Meriden, Conn.

MARINE Hardware Co., Peabody, Mass.

NOVELTY Mfg. Co., Waterbury, Conn.

RUNDLE-SPENCE Mfg. Co., 57 Second St., Milwaukee, Wis.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

CURTAIN FITTINGS

CURTAIN Supply Co., 320 W. Ohio St., Chicago, Ill.

HAND RAILING FITTINGS

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BRYANT & Berry Co., 28 W. Atwater St., Detroit, Mich.

CRANE Co., 1214 Canal St., Chicago, Ill.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

RUNDLE-SPENCE Mfg. Co., 57 Second St., Milwaukee, Wis.

WALWORTH Mfg. Co., Boston, Mass. (See page 571.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

MOTOR CYCLE FRAME FITTINGS

CROSBY CO., Buffalo, N. Y. (See page 227.)

PIPE FITTINGS

For Tubing or Brazing Fittings—See Tubing Unions.

BARD Union Co., Norwich, Conn.

BARRETT Mfg. Co., James, 50 Pearl St., Boston, Mass.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CENTRAL Brass Works, 322 W. Pearl St., Cincinnati, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DALTON-INGERSOLL Mfg. Co., 171-75 High St., Boston, Mass.

DARLING Pump & Mfg. Co., Williamsport, Pa.

EASTWOOD Wire Mfg. Co., Belleville, N. J.

FEWLESS-LEEN Brass & Iron Co., Cincinnati, O.

GRIP Coupling Co., Ware, Mass.

HAMLIN & Emery Brass Co., 49 Island St., Boston, Mass.

IDEAL Mfg. Co., 570 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

JARECKI Mfg. Co., Erie, Pa.

JEFFERSON Union Co., Lexington, Mass. (Unions only). (See page 671.)

KELLY & Jones Co., Greensburg, Pa.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 227-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

MULLANEY'S Sons, Jas., 141 E. 25th St., New York, N. Y.

PITTSBURG Valve & Fittings Co., 1610 Frick Bldg., Pittsburg, Pa.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

POWHATAN Brass & Iron Works, Charlestown, W. Va.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RICHARDSON—PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

RUNDLE-SPENCE Mfg. Co., 57 Second St., Milwaukee, Wis.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

STODDARD Union Co., 60 Arch St., Boston, Mass.

UNION CINCH—See Richardson-Phenix Co.

WALWORTH Mfg. Co., Boston, Mass. (See page 571.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St. Chicago Ill. (See page 633.)

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

SPRAY HOOD FITTINGS

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

MARINE Hardware Co., Peabody, Mass.

NEPTUNE Hardware Mfg. Co., 54 South St., New York, N. Y.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOOD & Chute Machine Co., Greenport, N. Y.

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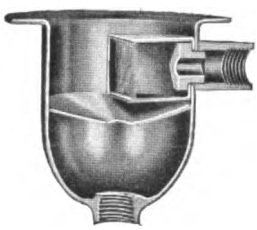
Hans Motor Equipment Co.

HIGH GRADE MOTOR EQUIPMENT

LA CROSSE, WIS.

THE HANS GASOLINE GAUGE

Is a simple, reliable device placed on the dashboard, assuring the driver at all times of the full supply of gasoline in the tank. It is automatic, in sight every minute the car is in operation, and is used by some of the best makers as standard equipment. Furnished in brass, bright nickel, or black nickel finish.



HANS GASOLINE SEPARATOR

Is a practical device to extract all dirt, paraffin and water from the gasoline by scientific gravitation. The Hans Gasoline Separator brings best service out of any motor, and absolutely eliminates carburetor trouble. The fact that several manufacturers of motor cars and motor boats use this device as regular equipment proves that it is entirely practical.

GASOLINE TANK FILLER CAP

Showing position when open.

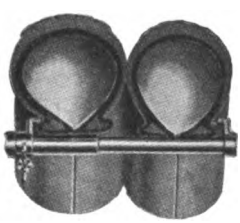
This cap is drawn out of steel or brass. It is compact, allowing tank to set close to seat of the car. The vent is placed on the side of the rim to prevent dirt or water entering the tank.

As it will look when attached to tank.

THE HANS QUICK DETACHABLE TIRE CARRIERS

Carrier not in use. Telescoped to 5 inches.

These Tire Carriers are mechanically correct ; their construction represents the best in tire carrier advancement. The parts used are of the highest grade, specially adapted to withstand the hard usage and vibrations of motor travel.



The material in our equipment is the best that money can buy, and the workmanship is better, much better, than you expect. The fact that our equipment is used by some of the best makers of cars as STANDARD EQUIPMENT proves more than we could personally guarantee. "WE SOLICIT YOUR INQUIRIES."

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FITTINGS (Continued)

TOP FITTINGS AND FIXTURES

(See also Bows, Top; also Fasteners, Curtain; also Irons, Slat; also Irons, Top; also Rests, Bow; also Separators, Bow; also Sockets, Bow; also Straps, Top)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BLAKESLEE Forging Co., Plantsville, Conn.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

CRANDAL, Stone & Co., Binghamton, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 635.)

DRUEN, B. D., 71 Hamilton St., New Haven, Conn.

ENGLISH & Mersick Co., New Haven, Conn

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

HIGGIN Mfg. Co., Newport, Ky.
(See page 183.)

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2833-44 Spring Grove Ave., Cincinnati, O.

MURPHY Co., G. W. J., Merrimac, Mass.

NEWTON & Son, W. H., 125 Elm St., Cortland, N. Y.

PARRY & Co., A. N., Amesbury, Mass.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

FIXTURES

MOTOR BOAT ELECTRIC LIGHT FIXTURES

PORTER Co., 194 Water St., New York, N. Y.

RUSSELL & Stoll Co., New York, N. Y.

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

CARPENTER & Co., Geo. B., 206 S. Water St., Chicago, Ill.

CHICAGO Flag & Decorating Co., 1349 Wabash Ave., Chicago, Ill.

FORKER & Co., C. A., 47 Warren St., New York, N. Y.

GOSS Co., J. C., 10 Atwater St., E. Detroit, Mich.

GREENWOOD - ATKINSON - ARMSTRONG Co., 75 Woodward Ave., Detroit, Mich.

HEMMENWAY & Son, 54-55 South St., New York, N. Y.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

PEASE Co., L. F., Providence, R. I.

VANDERHERCHENS Sons, 7 N. Water St., Philadelphia, Pa.

WEEKS-HOWE-EMERSON Co., 51 Market St., San Francisco, Cal.

FLANGES

PRESSED STEEL HUB FLANGES

(For Forged or Cast Flanges—See Forgings; also Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

CROSBY Co., Buffalo, N. Y.
(See page 227.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 243.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, Ohio.
(See page 671.)

STOLL Pressed Steel Co., Buffalo, N. Y.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

FLAGS

SIGNAL FLAGS AND EMBLEMS

AMERICAN Flag Co., 45-47 Elizabeth St., New York, N. Y.

ANNIN & Co., 99-101 Fulton St., New York, N. Y.

FLOATS

CORK CARBURETER FLOATS

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

PADDOCK Cork Co., 1209-17 DeKalb Ave., Brooklyn, N. Y.

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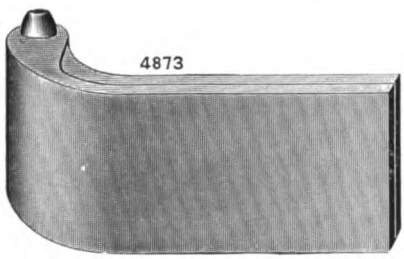
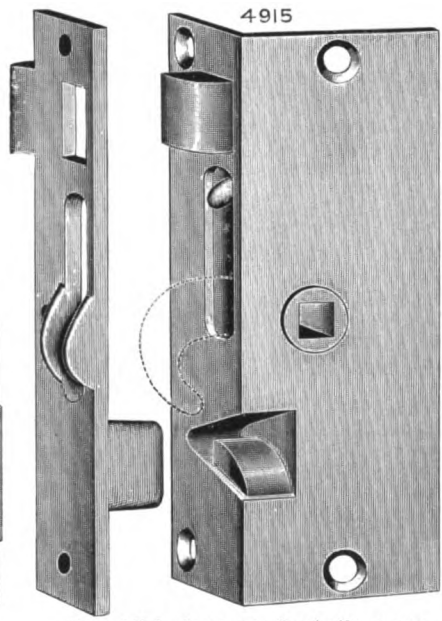
The Ackerman Automatic Wind Shield

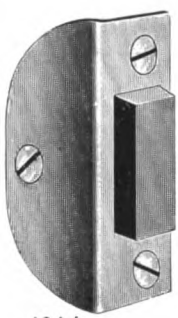
has established a new standard of excellence, satisfaction and durability.

Its best advocates are those who use it.

ASK AN OWNER







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Malleable Coach Hinges
Brass Coach Hinges
Lamp Brackets
Foot Rests (Folding)
Hood Handles
Curtain Fasteners
Footman Loops

Tire Holders
Strap Loops
Body or Grab Handles
Side Door Handles
Dash Mouldings
Running Board Mouldings

Carpet Binding
Bow Separators
Bow Rests
Hood Hinges
Deck Rails
Continuous Hinges
Side Door Locks

Automatic Hook Locks
Finishing Bolts
Wind Shields (Ackerman)
Finishing Screws
Washers and many other useful articles

JOS. N. SMITH & CO., Detroit, Mich.

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FLOATS (Continued)

METAL CARBURETER FLOATS

FITZGERALD Gasket Co., Torrington, Conn.
(See page 553.)

GOODNOW & Blake Mfg. Co., Fourth & Porter Sts., Detroit, Mich.

GOODWIN & Kintz Co., Winsted, Conn.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

NAUGATUCK Mfg. Co., Naugatuck, Conn.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

FORGINGS

DROP FORGINGS

AMERICAN Spiral Pipe Works, 14th St. & 48th Ave., Chicago, Ill.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 541.)

ATLAS Drop Forge Co., Lansing, Mich.
(See page 319.)

ATWATER Mfg. Co., Southington, Conn.

BAKER Drop Forge Co., Jackson, Mich.
(See page 537.)

BARNETT Drop Forging Co., East Hampton, Mass.
(See page 115.)

BATES Forge Co., 225 Merrill St., Indianapolis, Ind.

BELDEN Machine Co., Whalley Ave. & Tryon St., New Haven, Conn.

BETHLEHEM Steel Co., So. Bethlehem, Pa.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BLAKESLEE Forging Co., Plantsville, Conn.

BUFFALO Drop Forging Co., 16 Perry St., Buffalo, N. Y.

CAMBRIA Forge Co., Johnstown, Pa.

CANTON Drop Forging & Mfg. Co., Canton, O.
(See page 319.)

CAPE Ann Tool Co., Granite St., Pigeon Cove, Mass.

CHICAGO Crossing Co., West Chicago, Ill.

CHICAGO Drop Forge & Foundry Co., 447-517 Kensington Ave., Chicago, Ill.

CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Drop Forge Co., Cleveland, O.

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

COLUMBIAN Hardware Co., 1296 E. 53d St., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

COLUMBUS Forge & Iron Co., Columbus, O.

CONSOLIDATED Mfg. Co., Toledo, O.
(See page 319.)

CORTLAND Forging Co., Cortland, N. Y.

CRESCENT Forgings Co., Oakmont, Pa.

DEAN Forging Co., 1825 E. Jackson St., Muncie, Ind.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Steel Products Co., Boulevard & Griffin St., Detroit, Mich.

DIAMOND Forging & Mfg. Co., Pittsburg, Pa.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

DROP Forging Co. of New York, West Side Ave. & Fisk St., Jersey City, N. J.

DUNNE Co., Geo. W., 687-91 Carroll Ave., Chicago, Ill.

ECCLES Co., Richard, Auburn, N. Y.

ELLIOTT, H. A., 701 American Trust Bldg., Cleveland, O. (Importers.)
(See page 537.)

ELMORE Tool Mfg. Co., Hartford, Conn.

EMERGENCY Forge Co., Lansing, Mich.
(See page 319.)

ERIE Forge Co., 15th & Cascade Sts., Erie, Pa.

EUREKA Tempered Copper Works, North East, Pa.

FOREST City Electric Co., 5003 Windsor Ave., Cleveland, O.

FRUIN Drop Forge Co., 345 Root St., Chicago, Ill.

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 355.)

GLOBE Malleable Iron & Steel Co., Greenway Ave., Syracuse, N. Y.

HERBRAND Co., Fremont, O.

HESS-PONTIAC Spring & Axle Co., Pontiac, Mich.
(See page 709.)

HIGGINS Spring & Axle Co., Racine, Wis.
(See page 393.)

HUPP-JOHNSON Forge Co., Lycaste St. & Terminal R. R., Detroit, Mich.

INDIANAPOLIS Drop Forging Co., Madison Ave. & Downing St., Indianapolis, Ind.

INGALLS-SHEPARD Forging Co., McCormick Bldg., Chicago, Ill.
(See page 193.)

JACKSON Drop Forging Co., Jackson, Mich.

KEYSTONE Drop Forge Works, Chester, Pa.

KILBORN & Bishop Co., 81 Lloyd St., New Haven, Conn.

KRUPP—See Prosser & Son.

LAKESIDE Forge & Wrench Co., Erie, Pa.

LEWIS Spring & Axle Co., Jackson, Mich.
(See page 574.)

McKAY Co., James, Second National Bank Bldg., Pittsburg, Pa.

MACHINERY Forging Co., Hamilton & Marquette Sts., Cleveland, O.

MARSHALLTOWN Drop Forge Co., 302 S First Ave., Marshalltown, Ia.

MARTIN Forging Co., H. J., 510 Harding St., Indianapolis, Ind.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Works, foot of Meldrum Ave., Detroit, Mich.

MOORE Drop Forging Co., Birnie Ave., Springfield, Mass.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

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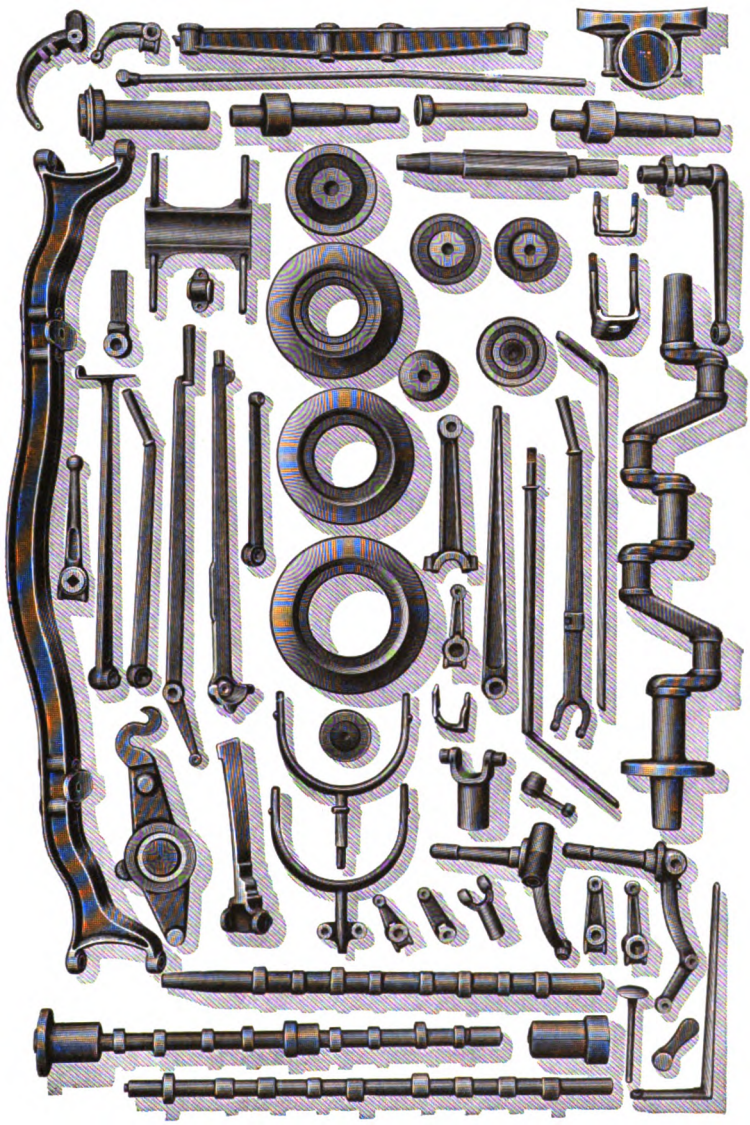
FORGINGS



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HARTFORD, CONN.

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CLAIRE L. BARNES & COMPANY

General Offices, McCormick Building **CHICAGO**

BRANCH OFFICES:

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We make

CRANK-SHAFT FORGINGS
AXLE FORGINGS
LEVER FORGINGS
GEAR FORGINGS
FOOT LEVER FORGINGS
CONNECTING-ROD FORGINGS
SPRING-CLIP FORGINGS
STEERING-KNUCKLE FORGINGS

and all descriptions of forgings, a few samples of which are shown on the reverse side of this page.

Our equipment includes complete Laboratory facilities, insuring correct chemical and physical qualities. Also complete electric-welding facilities.

We carry in stock a variety of forgings and machined parts, such as

STEERING CONNECTIONS
FORE AND AFT CONNECTIONS
ROD AND YOKE ENDS

Our Catalog lists the above, and also Tools of our own make for Automobiles. Write for this Catalog.

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FORGINGS (Continued)

DROP FORGINGS (Continued)

O. K. Tool Holder Co., Shelton, Conn.

OBENBERGER Drop Forge Co., 320 Lake St., Milwaukee, Wis.

OHIO Forge Co., 2186-2210 E. 65th St., Cleveland, O.
(See page 651.)

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PARK Drop Forge Co., Cleveland, O.
(See page 193.)

PORTLAND Foundry & Machine Co., Portland, Ind.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.) cf

REVERE Drop Forge Co., Revere, Mass.

RICHMOND Forging Corp. (Acca Station), Richmond, Va.

RIVETLESS Chain & Engineering Co., Lebanon, Pa.

ROCHESTER Drop Forge Co., Ames St., Rochester, N. Y.

SCRANTON Forging Co., Scranton, Pa.

SEWARD & Son Co., M., Grant St., New Haven, Conn.

SMITH & Co., H. D., Plantsville, Conn.

SUNDBERG-KROPP & Co., 2510 W. 21st St., Chicago, Ill.

STRIEBY & Foote Co., 301 Ogden St., Newark, N. J.

TRANSUE & Williams Co., Alliance, O.

UNION Drop Forge Co., 358 Indiana St., Chicago, Ill.

UNION Forging Co., Union, N. Y.
(See page 755.)

UNION Mfg. & Drop Forge Co. (E. Providence), Providence, R. I.

VAN Doren Mfg. Co., 17th & Arnold Sts., Chicago Heights, Ill.

VICTOR Iron Works Co., 521 Schofield Bldg Cleveland, O.

WATERLOO Drop Forge Co., Falls Ave. & Orr St., Waterloo, Ia.

WAVERLEY Co., Indianapolis, Ind.

WESTERN Drop Forge Co., Marion, Ind.
(See page 489.)

WESTERN Malleable Steel Co., 1250 Jefferson Ave., W., Detroit, Mich.

WESTERN Tool & Forge Co., Brackenridge, Pa.
(See page 711.)

WHITMAN & Barnes Mfg. Co., Akron, O.

WILCOX, Crittenden & Co., 33 Main St., Middletown, Conn.

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

WILLIAMS & Co., J. H., 150 Hamilton Ave., Brooklyn, N. Y.

WRIGHT Wrench & Forging Co., 1424 Barth St., Canton, O.
(See page 573.)

WYMAN & Gordon Co., Worcester, Mass.
(See page 169.)

FRAMES

KNOCK DOWN FRAMES

ANDERSON, Oscar, East Norwalk, Conn.

BROOKS Mfg. Co., Saginaw, Mich.

DEFOE Boat & Motor Works, Bay City, Mich.

GINMAN Boat Co., 452 Lake St., Detroit, Mich.

HYDE Metal Boat Co., 1 Fairbanks St., Watertown, N. Y.

MONITOR Boat & Engine Co., Emmett & Wrights Sts., Newark, N. J.

NIAGARA Motor Boat Co., No. Tonawanda, N. Y.

OSBORN, W. R., Croton, N. Y.

THOMPSON Boat & Pattern Works, H. F., Decorah, Iowa.

TOPPAN Boat Mfg. Co., 25 Haverhill St., Boston, Mass.

VALLEY Boat & Engine Co., 2700 River St., Saginaw, Mich.

MOTOR CYCLE SPRING FRAMES.

CHICAGO Motorcycle Works, 732 Sheridan Rd., Chicago, Ill.

PRESSED STEEL FRAMES

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. "Presteel."
(See page 243.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

HYDRAULIC Pressed Steel Co., Cleveland, O.
(See inside back cover.)

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

KRUPP—See Prosser & Son.

PARISH Mfg. Co., Reading, Pa.
(See page 197.)

PARISH & Bingham Co., Cleveland, O.
(See page 195.)

PRESTEEL—See Detroit Pressed Steel Co.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

SMITH Co., A. O., Milwaukee, Wis.
(See page 397.)

STAR Foundry & Machine Works, 600 W. 14th St., Anderson, Ind.

FRICTIONS

FIBRE FRICTIONS

(For use in Friction Transmission)

ROCKWOOD Mfg. Co., 1800 English Ave., Indianapolis, Ind.

FUNNELS

GASOLINE FUNNELS

ATLANTIC Stamping Co., Rochester, N. Y.

BROWN'S Automatic Funnel Bucket Co., 3219-21 S. Figueroa St., Los Angeles, Cal.

Complete Index to Classification appears on Pages 8 to 22.

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FUNNELS (Continued)

GASOLINE FUNNELS (Continued)

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. "Saval." (See page 197.)

FAUPEL, C. F., 711 Dearborn St., Chicago, Ill.

GIBSON, C. R., Salamanca, N. Y.

GOODWIN & Kintz Co., Winsted, Conn.

MASON Co., Geo. H., 150 Blackstone St., Boston, Mass. (See page 197.)

PURITAN—See Sexton Can Co.

SAVAL—See Dover Stamping & Mfg. Co.

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass. "Puritan."

TALIAFERRO, W. T., 258 Broadway, New York, N. Y.

VOGEL & Bros., Wm., 37 S. Ninth st., Brooklyn, N. Y.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WILSON & Co., F. Cortez, 239-41 Lake St., Chicago, Ill.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

FURNITURE

MOTOR BOAT WICKER FURNITURE

(See also Chairs—Arm, Steamer and Camp)

BAILIE Basket Co., 82 Sudbury St., Boston, Mass.

CAPITAL Rattan Co., Naomi & Shelby Sts. Indianapolis, Ind.

FICKS Carriage & Reed Co., Findlay & Charlotte Sts., Cincinnati, O.

GOPHER Carriage & Toy Co., 50 W. 7th St., St. Paul, Minn.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

OMAHA Reed & Rattan Mfg. Co., 119 N. 15th St., Omaha, Neb.

ST. Louis Rattan Co., 1608-24 S. 2d St., St. Louis, Mo.

SONS & Cunningham Rattan Co., 26 Cherry St., New York, N. Y.

WHITNEY Reed Chair Co., Leominster, Mass.

WICKER-CRAFT Co., Newburgh, N. Y.

YPSILANTI Reed Furniture Co., Ionia, Mich.

GALVANIZING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

BUFFALO Galvanizing & Tinning Works, 49-53 Jackson St., Buffalo, N. Y.

CLEVELAND Galvanizing Works Co., 18-24 Cooper St., Cleveland, O.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Philadelphia, Pa. (See page 281.)

DANA Mfg. Co., Cincinnati, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)

GALVANIZING Co., 525 N. Front St., Philadelphia, Pa.

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GLOBE Machine & Stamping Co., Cleveland, O. (See page 99.)

GRABLER Mfg. Co., Cleveland, Ohio.

MALLEABLE Iron Fittings Co., Branford, Conn. (See page 349.)

MEAKER Co., 218-24 N. Elizabeth St., Chicago, Ill.

NEW England Sherardizing Co., Hartford, Conn.

NEW Haven Sherardizing Co., State & Lawrence Sts., New Haven, Conn.

NEW York Sherardizing Co., 118-20 Green St., Brooklyn, N. Y.

OHIO Sherardizing Co., Whitney Power Blk., Cleveland, O.

PROVIDENCE Autogenous Welding & Mfg. Co., Providence, R. I. (See page 461.)

SCHUTZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

TOWER Mfg. Co., Madison, Ind.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

U. S. Electro-Galvanizing Co., 1-9 Park Ave. Brooklyn, N. Y.

VAIL Galvanizing Plant, 211 Commercial St., Boston, Mass.

GAPS

SPARK GAPS

CHAMPION Spark Plug Co., 609 Jefferson Ave., Toledo, O. "Misskip." (See page 327.)

HERZ & Co., Puck Bldg., New York, N. Y. "Oscillum." (See page 335.)

MANVILLE, Geo. W., Towanda, Pa.

MEANS, Eugene D., Towanda, Pa.

MISSKIP—See Champion Spark Plug Co.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y. (See page 323.)

MOTOR Supply Co., Havana, Ill. "Rex."

NEW England Equipment Co., 545 Old South Bldg., Boston, Mass. "Phelps."

OSCILLUM—See Herz & Co.

PHELPS—See New England Equipment Co.

POINT Spark Plug Co., Aberdeen, S. D.

REX—See Motor Supply Co.

SIMPLEX Sales Co., 156 Market St., Newark, N. J.

GASKETS

METALLIC GASKETS

(For Asbestos, Composition or Rubber Gaskets—See Packing)

AKRON Metallic Gasket Co., 274 Park St., Akron, O.

BETTCHER Mfg. Co., Cleveland, O. (See page 625.)

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GASKETS (Continued)

METALLIC GASKETS (Continued.)

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I.
(See page 623.)

DETROIT Radiator Co., Detroit, Mich.

DOMINION Stamping Co., Walkerville, Ont., Can.
(See page 221.)

FITZGERALD Gasket Co., Torrington, Conn.
(See page 553.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa. "Right."

GOODWIN & Kintz Co., Winsted, Conn.

HERZ & Co., Puck Bldg., New York, N. Y. (Importers.)
(See page 335.)

McCORD Mfg. Co., Detroit, Mich. "McKim."
(See pages 58 and 59.)

McKIM—See McCord Mfg. Co.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.
(See page 221.)

MONROE Electric Mfg. Co., Box 57, Monroe, Mich.
(See page 631.)

RIGHT—See Gasket Supply Co.

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

UNITED States Indestructible Gasket Co., 50 Church St., New York, N. Y.

VICTOR Mfg. & Gasket Co., 3000 W. 21st Pl., Chicago, Ill.
(See page 361.)

GASOLINE

AUTOMOBILE GASOLINE

BUCK & Co., E. A., Worcester, Mass. "Powers."

CREW-LEVICK Co., Land Title Bldg., Philadelphia, Pa.

GULF Refining Co., Pittsburg, Pa.

PETROLEUM Products Co., 3600 Grant Blvd., Pittsburg, Pa. "Vigorite."
(See page 219.)

POWERS—See Buck & Co.

STANDARD Oil Co., 26 Broadway, New York, N. Y.
(See back cover.)

TEXACO—See Texas Co.

TEXAS Co., New York, N. Y. "Texaco."
(See page 199.)

VIGORITE—See Petroleum Products Co.

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa.

GATES

AUTOMATIC DRIVEWAY GATES

BYERLY—See Cargill Mfg. Co.

CARGILL Mfg. Co., West End of Buttles Ave., Columbus, O. "Byerly."

MANLOVE Gate Co., 17 W. Huron St., Chicago, Ill.

GAUGES

BATTERY GAUGES

(Pocket Battery Testers. For Standard Instrument —See Ammeters)

ADVANCE—See Eldredge Electric Mfg. Co.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

ATWATER Kent Mfg. Works, 44 N. Sixth St., Philadelphia, Pa.
(See page 747.)

B. & R.—See Beckley-Ralston Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "B. & R."
(See page 159.)

CEMCO—See Clark Electric Meter Co.

CLARK Electric Meter Co., 126-28 S. Clinton St., Chicago, Ill. "Cemco."

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn.
(See page 369.)

DITTMAR—See Manhattan Electrical Supply Co.

DOW Mfg. Co., Braintree, Mass.

ECLIPSE—See Eldredge Electric Mfg. Co.

ELDREDGE Electric Mfg. Co., 7 Post Office Square, Springfield, Mass. "Advance," "Express," "Eclipse."

ELITE—See Manhattan Electrical Supply Co.

ETNA Electric Works, 145 E. 23d St., New York, N. Y.

EVER READY—See American Ever Ready Co.

EXCEL Instrument Co., 1555 E. 65th St., Cleveland, O.

EXPRESS—See Eldredge Electric Mfg. Co.

GOODSON Electric & Mfg. Co., Providence, R. I.

HANDY—See Roller-Smith Co.

HOYT Electrical Instrument Works, Penacook, N. H. "Triune," "Ultimate."

MANHATTAN Electrical Supply Co., 17 Park Place, New York, N. Y. "Dittmar," "Elite."
(See page 615.)

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

READRITE Meter Works, 22 Main St., Bluffton, O.

ROBERT Instrument Co., 56 Shelby St., Detroit, Mich.

ROLLER-SMITH Co., 203-05 Broadway, New York, N. Y. "Handy."

STACKPOLE Battery Co., St. Marys, Pa.
(See page 653.)

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GAUGES (Continued)

BATTERY GAUGES (Continued)

STERLING Mfg. Co., American Trust Bldg., Cleveland, O.

TRIUNE—See Hoyt Electrical Instrument Works.

ULTIMATE—See Hoyt Electrical Instrument Works.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

BOILER WATER-LINE GAUGES

(For indicating height of water in steam boilers)

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

JERGUSON Mfg. Co., 221 Columbus Ave., Boston, Mass. "Klinger."

KLINGER—See Jerguson Mfg. Co.

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

CYLINDER COMPRESSION GAUGES

(For testing compression in gas engine cylinders)

A. B. C.—See Artizan Brass Co.

ARTIZAN Brass Co., 876 Lincoln Park Blvd., Chicago, Ill. "A. B. C."

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

EDELMANN & Co., E., 47-49 W. Kinzie St., Chicago, Ill.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

WALKER Co., H. W., 124-26 Rosenbloom Bldg., Syracuse, N. Y.
(See page 507.)

GASOLINE TANK GAUGES

(For indicating amount of gasoline in fuel tanks)

BOSTON Auto Gage Co., 12 Waltham St., Boston, Mass. "Triumph," "Tankoscope."
(See page 201.)

E-Z-2-C—See National Motor Supply Co.

EMERGENCY Novelty Co., Port Huron, Mich.

EUREKA Gauge Co., 56 Shelby St., Detroit, Mich.

FREER Gauge Co., Akron, O.

GILBERT & Barker Mfg. Co., 80 Fourth Ave., New York, N. Y.
(See page 657.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANKS Gasoline Meter Co., 381 West End Ave., New York, N. Y.

HANS Motor Equipment Co., La Crosse, Wis.
(See page 187.)

HUBBARD, H. W., 11 Butternut St., Middletown, Conn.

JONES Speedometer Co., New Rochelle, N. Y.

KANT-STIK—See National Motor Supply Co.

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.
(See page 503.)

MURPHY'S—See Schaeffer & Budenberg Mfg. Co.

NATIONAL Motor Supply Co., Cleveland, O. "Kant-Stik," "E-Z-2-C."

RANDALL-FAICHNEY Co., 251 Causeway St., Boston, Mass. "Webster."
(See pages 171 and 669.)

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y. "Murphy's."

SMITH Gasoline Meter Co., Thoroughfare Bldg., New York, N. Y.

SPRINGFIELD—See Gilbert & Barker Mfg. Co.

TANKOSCOPE—See Boston Auto Gage Co.

THREADGOLD, Geo. J., Port Huron, Mich.

TRIUMPH—See Boston Auto Gage Co.

WEBSTER—See Randall-Faichney Co.

STEAM AND AIR GAUGES

(Standard Pressure Gauges)

AMERICAN Steam Gauge & Valve Mfg. Co., Pope Bldg., Boston, Mass.

ASHCROFT Mfg. Co., 85-89 Liberty St., New York, N. Y.
(See page 559.)

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

CLEVELAND Steam Gauge Co., 1619 Merwin Ave., N. W., Cleveland, O.

IMPROVED Gage Mfg. Co., Syracuse, N. Y.

MARSH & CO., Jas. P., 321-23 W. Washington St., Chicago, Ill.

PITTSBURGH Gage & Supply Co., 30th & Liberty Sts., Pittsburg, Pa.

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass

STAR Brass Mfg. Co., 103-14 E. Dedham St. Boston, Mass.

UNITED States Gauge Co., 67 Wall St., New York, N. Y.

TIRE PRESSURE GAUGES

(For indicating pressure in tires—See also Valves, Tire Safety)

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. "Tyrometer."
(See page 121.)

BOWDEN Co., J. A., 356 Dearborn St., Chicago, Ill. "Staput."

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

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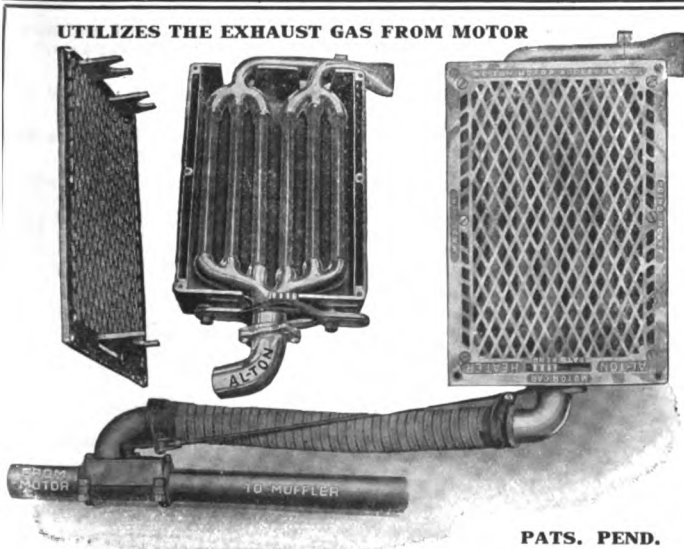

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GAUGES (Continued)

TIRE PRESSURE GAUGES (Continued.)

EDELMANN & Co., E., 47-49 W. Kinzie St., Chicago, Ill.

IMPROVED Gage Mfg. Co., Syracuse, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Washburn."
(See page 339.)

KELLOGG Mfg. Co., E. Main & Circle Sts., Rochester, N. Y. "National."

NATIONAL—See Kellogg Mfg. Co.

NEWERF Rubber Co., W. D., 949 S Main St., Los Angeles, Cal. "Twitchell."

ROSE & Simons, 111 W. 18th St., Kansas City, Mo.

SAFETY Tire Gauge Co., 1463 Michigan Ave., Chicago, Ill.

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

STAPUT—See Bowden Co.

STEVENS & Co., 375 Broadway, New York, N. Y.
(See page 161.)

TWITCHELL—See Newerf Rubber Co.

TYROMETER—See Allen Auto Specialty Co.

UNITED States Gauge Co., 67 Wall St., New York, N. Y.

WALKER Co., H. W., 124-26 Rosenbloom Bldg., Syracuse, N. Y.
(See page 507.)

WASHBURN—See Judd & Leland Mfg. Co.

WATER CIRCULATION GAUGES

(For indicating pressure in water cooling systems)

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

IMPROVED Gage Mfg. Co., Syracuse, N. Y.

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

GAUNTLETS

MOTORISTS GAUNTLETS

(See Gloves, Motorists)

GEARS

BLANK GEARS

(See also Forgings; also Castings)

AMERICAN Spiral Pipe Works, 14th St. & 48th Ave., Chicago, Ill.

AMERICAN & British Mfg. Co., 1718 Crescent Ave., Bridgeport, Conn.

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 541.)

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 269.)

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BLAKESLEE Forging Co., Plantsville, Conn.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O.

DETROIT Screw Works, Detroit, Mich.
(See page 739.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

ELLIOTT, H. A., 701 American Trust Bldg., Cleveland, O. (Importers.)
(See page 537.)

GANSCHOW Co., Wm., 1001-05 W. Washington Blvd., Chicago, Ill.
(See page 545.)

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 355.)

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 601.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.)
(See pages 613 and 709.)

JOLIET Forge Co., Joliet, Ill.

KRUPP—See Prosser & Son.

McINNES Steel Co., Corry, Pa.

MICHIGAN Screw Co., Lansing, Mich.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

OBENBERGER Drop Forge Co., 220 Lake St., Milwaukee, Wis.

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

R. . .E Machine & Tool Works, S., 224-30 W. **Main St., Plymouth, Pa.**

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

SMITH Co., Thos., 13 Cypress St., Worcester. Mass.

SUNDBERG-KROPP & Co., 2510 W. 21st St., Chicago, Ill.

U. S. Automatic Co., Amherst, O.

DIFFERENTIAL GEARS

BARNES Gear Co., Oswego, N. Y.
(See page 514.)

BROWN-LIPE-CHAPIN Co., Syracuse, N. Y.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 207.)

CULLMAN Wheel Co., 1350 Greenwood Terrace, Chicago, Ill.
(See page 395.)

FALLS Machine Co., Sheboygan Falls, Wis.
(See page 589.)

FLANDERS Mfg. Co., Pontiac, Mich. "Vulcan."
(See pages 123, 124 and 545.)

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WE CUT ACCURATE METAL GEARS.

WE have one of the largest and best equipped plants in the country for turning out accurate gears of any kind and material, and in any quantity. Have 80 gear cutting machines including Fellows Gear Shapers, Brown & Sharpe and Gould & Eberhardt Rotary Cutters and 38 Gleason Generators for bevel work and 10 special hobbing machines for spirals, herringbone and helical gears. Our lathe equipment is in keeping and includes the best types of automatic screw machines and turret lathes taking stock through the spindle up to 4½″ diameter. We have six large hardening furnaces fitted with a pyrometer system and are thoroughly familiar with the proper treatments of the special steels. And we have a reputation for the high quality of our work, which is second to none.

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GEARS (Continued)

DIFFERENTIAL GEARS (Continued)

FROST Gear & Machine Co., Jackson, Mich.
(See page 575.)

GRAHAM Differential Gear Co., 2123 Michigan Ave., Chicago, Ill.

METAL Products Co., Water St. & Detroit Terminal R. R., Detroit, Mich.
(See page 745.)

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

MURRAY Machine Works, 1924 Wabansia Ave., Chicago, Ill.
(See page 557.)

NEW Process Raw Hide Co., Syracuse, N. Y.
(See page 203.)

PROVIDENCE Engineering Works, Providence, R. I.
(See page 367.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 209.)

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page 489.)

VULCAN—See Flanders Mfg. Co.

WARNER Gear Co., Muncie, Ind.
(See page 151.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y.

MOTOR BOAT REVERSE GEARS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Oil Engine Co., Danielson, Conn.

AUTOMATIC Machine Co., 113 E. Washington Ave., Bridgeport, Conn.

BALDRIDGE—See Smith & Baldridge Machine Co.

BALL—See New York Gear Works.

BENTON Electric Co., 106-08 Pearl St., La Crosse, Wis.

CAMDEN Anchor-Rockland Machine Co., Camden, Me.

EUREKA Reverse Gear Works, Troy, N. Y.

EVANS Stamping & Plating Co., 60 Cushman St., Taunton, Mass. "Paragon."

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 581 and 584.)

GIES Gear Co., Detroit, Mich.

GILE Boat & Engine Co., Ludington, Mich.

HARTHAN—See McFarland Foundry & Machine Co.

HOLLADAY Engineering Co., Chicago, Ill.

JOES—See Snow & Petrelli Mfg. Co.

JOHNSON Machine Co., Carlyle, Manchester, Conn.

McFARLAND Foundry & Machine Co., Trenton, N. J. "Harthan."

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

NEW York Gear Works, Greenpoint Ave. nr. West St., Brooklyn, N. Y. "Ball."
(See page 545.)

ORMSBEE & Co., A. A., 35 Vernon St., Taunton, Mass. "Tuttle."

PARAGON—See Evans Stamping & Plating Co.

SMITH & Baldridge Machine Co., Detroit, Mich. "Baldridge."

SNOW & Petrelli Mfg. Co., 152 Brewery St., New Haven, Conn. "Joes."

STANDARD Gear Co., 165 Field Ave., Detroit, Mich.

TUTTLE—See Ormsbee & Co.

WISCONSIN Machinery & Mfg. Co., Canal St. & Muskego Ave., Milwaukee, Wis.

MOTOR BOAT STEERING GEARS

AMERICAN Ship Windlass Co., Providence, R. I. "Williamson."

BATH Marine Construction Co., Upper Washington St., Bath, Me.

DAKE Engine Co., Grand Haven, Mich.

DURKEE & Co., Chas. D., 2 South St., New York, N. Y.

EDSON Mfg. Co., 255-57 Atlantic Ave., Boston, Mass.

GEMMER Mfg. Co., Detroit, Mich.
(See page 410.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich.

HYDE Windlass Co., Bath, Me.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

MICHIGAN Wheel Co., Canal & Newberry St., Grand Rapids, Mich.

SEAMAN Motor & Launch Works, Long Branch, N. J.

SEELY Mfg. Co., J. A., Ogdensburg, N. Y.

STODDARD & Co., A. P., Gloucester, Mass.

WILLIAMSON—See American Ship Windlass Co.

MOTOR CYCLE TRANSMISSION GEARS

(See also Clutches, Free Engine.)

K & R—See Keller & Risque Motor Co.

KELLER & Risque Motor Co., 2237 Hampden Ave., St. Paul, Minn. "K & R."

LANG, C. H., 35 E. Adams St., Chicago, Ill.

RUNNING GEARS

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

CONTINENTAL Engine Co., 129-31 N. Canal St., Chicago, Ill.

DART Mfg. Co., Waterloo, Ia.
(See page 707.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GARFORD Co., Elyria, O.
(See page 55.)

GREENVILLE Metal Products Co., Greenville, Pa.

McCUE Co., Hartford, Conn.
(See pages 71 and 291.)

NEUSTADT Auto & Supply Co., 3948-50 Olive St., St. Louis, Mo.

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PLANETARY TRANSMISSION
For TRUCKS up to

And JACK SHAFT
30 Horse Power

For over 50 years we have been manufacturers of the world famous LEFEVER SHOTGUNS.

The same skill and workmanship is embodied in our Transmission and Jack Shaft.

An examination of one of our

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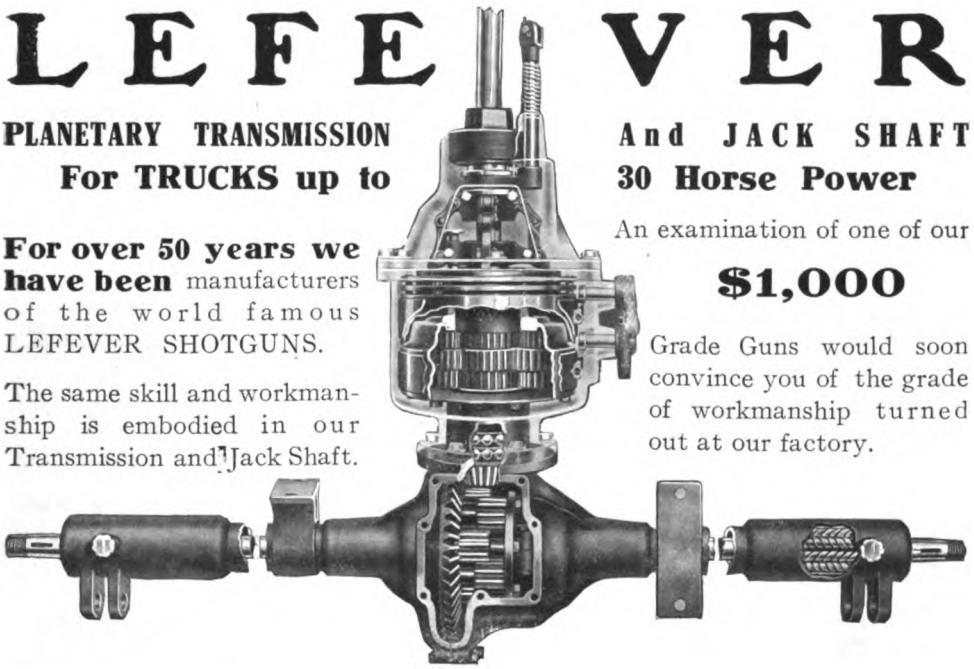
Grade Guns would soon convince you of the grade of workmanship turned out at our factory.



The distinctive features embodied in our product will be doubly welcomed by the trade as they overcome the Planetary Transmission difficulties which have been the weak link in the Truck Industry.

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Steel-Transmission
—and—
Differential-
-Gears-
In Quantities

Our new factory is one of the largest and best equipped in the country, and is devoted entirely to the production of High-Grade Gears. ¶ We also have an up-to-date Case Hardening Plant, for the treatment of carbon and alloy steels. ¶ Let us quote you on your specifications, and send you our 1911 Catalog of Stock Gears.

BOSTON GEAR WORKS

Boston Gear Works NORFOLK DOWNS MASS.

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GEARS (Continued)

STEERING GEARS

AMERICAN Gear & Mfg. Co., Jackson, Mich.
(See page 575.)

BAIRD Machine & Mfg. Co., 51-53 Fort St. E., Detroit, Mich.

BAKER Gear Co., Homer, N. Y.

BALDWIN Chain & Mfg. Co., Worcester, Mass. "Brown."
(See page 175.)

BARNES Gear Co., Oswego, N. Y.
(See page 514.)

BAYARD & Co., M. L., Woodbine, N. J. "Hindley."

BROWN—See Baldwin Chain & Mfg. Co.

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BUGGYABOUT—See Widmer Machine Wks.

BULTMAN, Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CHESTER Engineering & Machine Co., Chester, Pa.
(See page 293.)

CONTINENTAL Engine Co., 129-31 N. Canal St., Chicago, Ill.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 207.)

DETWILER Mfg. Co., Galion, O.

DOMESTIC Mfg. Co., Racine, Wis.

ELYRIA Machine Parts Co., Elyria, Ohio.

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FOSTER Gear Co., 244-46 Kaiser St., Columbus, O.

GEARLESS Steering Device Co., Odd Fellows Bldg., Indianapolis, Ind.

GEMMER Mfg. Co., Detroit, Mich.
(See page 410.)

GIANT—See Widmer Machine Works.

GRAEF-ARTHUR Engineering Co., Mt. Elliott & Gratiot Aves., Detroit, Mich.

HALL & Co., Daniel E., 19 High St., Boston, Mass.

HINDLEY—See Bayard & Co.

HINDLEY—See Morse, Williams & Co.

INDIANA Auto Parts Co., 33d & Nebraska Sts., Marion, Ind.

JACKSON-CHURCH-WILCOX Co., Hamilton & Monroe Sts., Saginaw, Mich.

JOHNSON Service Co., Milwaukee, Wis.

LAVIGNE Mfg. Co., 625 Commonwealth St., Detroit, Mich.

LITTLE GIANT—See Widmer Machine Works.

MORSE, Williams & Co., Philadelphia, Pa. "Hindley."

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.
(See page 514.)

OHIO Brass Co., Mansfield, O.

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 209.)

ROTH Tool Co., B., 2122-28 Choteau Ave., St. Louis, Mo.

SAMPSON Mfg. Co., Alden, Hawthorne & Mill Sts., Pittsfield, Mass.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

UNIVERSAL Mfg. Co., 1208-10 18th St., Racine, Wis.

WARNER Gear Co., Muncie, Ind.
(See page 151.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y. "Giant," "Little Giant," "Buggyabout."

TRANSMISSION GEARS

ADVANCE Power Co., 140 Dearborn St., Chicago, Ill.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Die & Tool Co., Reading, Pa.

ANDERSON Motor Co., 50 W. 16th St., Anderson, Ind.

AUTO Parts Mfg. Co., Detroit, Mich.
(See page 773.)

AUTO Parts Mfg. Co., Muncie, Ind. "B. T. K."

B.T.K.—See Auto Parts Mfg. Co.

BAIRD Machine & Mfg. Co., 51-53 Fort St. E., Detroit, Mich.

BALL—See New York Gear Works.

BARNES Gear Co., Oswego, N. Y.
(See page 514.)

BRENNAN Motor Mfg. Co., 103 Grape St., Syracuse, N. Y.

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BROWNELL Motor Co., F. A., 684-66 Lexington Ave., Rochester, N. Y.

BULTMAN & Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CHANDLER Planer Co., Ayer, Mass.

CHESTER Engineering & Machine Co., Chester, Pa.
(See page 293.)

CLIMAX Electric Works, New Salem, Mass.

CONTINENTAL Engine Co., 129-31 N. Canal St., Chicago, Ill.

COTTA Transmission Co., Rockford, Ill.

COVERT Motor Vehicle Co., Lockport, N. Y.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 207.)

CYCLOID Mfg. Co., 12 Grand St., W., Minneapolis, Minn.

DART Mfg. Co., Waterloo, Ia.
(See page 707.)

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.
(See page 683.)

DIEBOLD-PETERS Co., Whitney Power Bldg., Cleveland, O.

DIRECT Drive Mfg. Co., 505 Odd Fellows Bldg., Indianapolis, Ind. "Perkinson."

Complete Index to Classification appears on Pages 8 to 22.

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THE ONLY TRANSMISSION MADE FOR AUTOMOBILES

With Direct Drive on All Speeds

NO STRIPPING OF GEARS

No Countershaft.
No Sliding Gears.

GEARS ALWAYS IN MESH

No Friction Bands. No Racing of Engine.
Can Be Used on Any Car.
Will Outlast Any Automobile Made.
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MADE ONLY BY

The I. & F. MOTOR CAR CO.

BRANFORD, CONN.

Spur, Spiral, Bevel, Helical and

Worms, Racks

Silent Time Gears

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GEARS (Continued)

TRANSMISSION GEARS (Continued)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

FALLS Machine Co., Sheboygan Falls, Wis.
(See page 589.)

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FROST Gear & Machine Co., Jackson, Mich.
(See page 575.)

HALE Motor & Machine Co., 654 Franklin St., Detroit, Mich.

HUPP-TURNER Co., Lycastle St. & R. R., Detroit, Mich.

I & F. Motor Car Co., Branford, Conn.
(See page 207.)

INDIANA Auto Parts Co., 33d & Nebraska Sts., Marion, Ind.

INGLE Machine Co., Rochester, N. Y.
(See page 553.)

JAMESVILLE Mfg. Co., Jamesville, N. Y.

JOHNSON Service Co., Milwaukee, Wis.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.
(See page 205.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LONG Arm System Co., Cleveland, O.

LONG Distance Telephone Mfg. Co., South Bend, Ind.
(See page 593.)

MICHIGAN Auto Parts Co., Junction & M. C. R. R., Detroit, Mich.

MICHIGAN Automobile Co., Kalamazoo, Mich.

MODEL Gas Engine Works, Peru, Ind.
(See page 577.)

MOTOR & Mfg. Co., Indianapolis, Ind.

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

MUNSING Motor Car Co., 231-35 W. 40th St., New York, N. Y.

MURRAY Machine Works, 1924 Wabansia Ave., Chicago, Ill.
(See page 557.)

NEW York Gear Works, Greenpoint Ave. nr. West St., Brooklyn, N. Y. "Ball."
(See page 545.)

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.

OSWALD Motor Co., 511-13 Roswell Ave., Goshen, Ind.

PARKER Transmission & Appliance Co., Wilbraham Ave., Springfield, Mass.

PARKINSON—See Direct Drive Mfg. Co.

PROVIDENCE Engineering Works, Providence, R. I.
(See page 367.)

SCOTT-HARRIS Engine & Transmission Co., Board of Trade Bldg., Indianapolis, Ind.

SEITZ Automobile & Transmission Co., 225-27 Beecher Ave., Detroit, Mich.

SMITH Co., A. O., Milwaukee, Wis.
(See page 397.)

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 313.)

SUPERIOR Machine Tool Co., Kokomo, Ind.

SYRACUSE Gear Co., 103 Grape St., Syracuse, N. Y.

TURLEY Machine Co., H. G., 1505-11 N. Tenth St., St. Louis, Mo.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Fifth St. & Sampson Ave., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 151.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

WAUKESHA Motor Co., Waukesha, Wis.
(See page 287.)

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y.

YUSTER Axle & Transmission Co. of America, South Bend, Ind.

METAL GEARS AND PINIONS

ADAMS Co., Dubuque, Ia.

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

ARTHUR Co., 188 Front St., New York, N. Y.

BAUER Machine Co., Jeffersonville, Ind.

BILGRAM, Hugo, 1233 Spring Garden St., Philadelphia, Pa.

BLOUNT & Lovell, 96-102 High St., Boston, Mass.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 205.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CARPENTER-KERLIN Gear & Machine Co., 77 White St., New York, N. Y.
(See page 363.)

CINCINNATI Gear Co., 118-22 Opera Pl., Cincinnati, O.

COLLINS Gear & Motor Co., 319 Frick Bldg., Pittsburg, Pa.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 207.)

DAVIS, Rodney, Philadelphia, Pa.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.
(See page 683.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

EAGLE Gear & Machine Co., 141 Oxford St., Philadelphia, Pa.

EARLE Gear & Machine Co., Wyoming & Stenton Aves., Philadelphia, Pa.

FLANDERS Mfg. Co., Pontiac, Mich. "Vulcan."
(See pages 123, 124 and 545.)

FOOTE Bros. Gear & Machine Co., 217 N. Carpenter St., Chicago, Ill.
(See page 545.)

FROST Gear & Machine Co., Jackson, Mich.
(See page 575.)

GANSCHOW Co., Wm., 1001-05 W. Washington Blvd., Chicago, Ill.
(See page 545.)

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From the Heaviest Truck to the Lightest Runabout

The Ross Steering Gear

AND NOT

The Man Behind the Wheel

DOES THE WORK

It makes driving a pleasure—Not a danger.
Our large capacity ensures prompt delivery.
WRITE FOR BLUEPRINTS.

Ross Gear & Tool Company

949 MAIN STREET LAFAYETTE, IND.

QUALITY

UNIT POWER PLANTS

MOTORS

Transmissions *Differentials*
Steering Gears
"Truck Parts" *Control Levers*

Warner Mfg. Co., Toledo, Ohio

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GEARS (Continued)

METAL GEARS AND PINIONS (Continued)

GEAR Grinding Machine Co., Chene St. & Boulevard, Detroit, Mich.

GLEASON Works, 1100 University Ave., Rochester, N. Y.

GOULD & Eberhardt, N. J. R. R. Ave. & Green Sts., Newark, N. J.

GRANT Gear Works, 6 Portland St., Boston, Mass.

GRANT-LEES Machine Co., Cleveland, O.

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn.
(See page 673.)

HINDLEY—See Morse, Williams & Co.

HORSBURGH & Scott Co., 5144 Hamilton Ave., Cleveland, O.

KRUPP—See Prosser & Son.

MEISEL Press & Mfg. Co., 844-48 Dorchester Ave., Boston, Mass.

MORSE, Williams & Co., Philadelphia, Pa. "Hindley."

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEW Process Raw Hide Co., Syracuse, N. Y.
(See page 203.)

NEWARK Gear Cutting Machine Co., 66-68 Union St., Newark, N. J.

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

NUTTALL Co., R. D., 925 Fayette St., Pittsburg, Pa.

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PENNSYLVANIA Gear Works, 435 N. Broad St., Philadelphia, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

PROSSER & Son., Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 209.)

RUSSEL Wheel & Foundry Co., Detroit, Mich.

SAWYER Gear Works, 227 St. Clair St., Cleveland, O.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 671.)

SOUTH Park Mfg. Co., Port Huron, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 313.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

T. C. M. Mfg. Co., 46-54 Lawrence St., Newark, N. J.

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

TURLEY Machine Co., H. G., 1505-11 N. Tenth St., St. Louis, Mo.

VAN Dorn & Dutton Co., 2714 E. 79th St., Cleveland, O.

VULCAN—See Flanders Mfg. Co.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 151.)

WESTERFIELD & Co., G. G., Henry & Senate Sts., Indianapolis, Ind.

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y.

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

WORCESTER Gear Works, 31 N. Foster St., Worcester, Mass.

RAWHIDE GEARS AND PINIONS

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 205.)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

EAGLE Gear & Machine Co., 141 Oxford St., Philadelphia, Pa.

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FROST Gear & Machine Co., Jackson, Mich.
(See page 575.)

GANSCHOW Co., Wm., 1001-05 W. Washington Blvd., Chicago, Ill.
(See page 545.)

GRANT Gear Works, 6 Portland St., Boston, Mass.

HORSBURGH & Scott Co., 5144 Hamilton Ave., Cleveland, O.

MEISEL Press & Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.

NEW Process Raw Hide Co., Syracuse, N. Y.
(See page 203.)

NON-SWELL—See Widmer Machine Works.

NUTTALL Co., R. D., 925 Fayette St., Pittsburg, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

QURIDE Co., Cor. N. Salina & Turtle Sts., Syracuse, N. Y. "Quride."

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 671.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y. "Non-Swell."

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

GENERATORS

ACETYLENE GAS GENERATORS

(For Acetylene Tanks—See Tanks, Acetylene)

ARNOLD—See Standard Electric Works.

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 259.)

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

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do away with your timing gear troubles and let us show you how to get quiet gears in the front of your engines? We are doing it for other people and can do it for you.

IF YOU

are interested in worm and worm gear rear axle drives, remember we have had these drives in successful operation for years.

—THE—

LEES-BRADNER CO.

CLEVELAND, U. S. A.

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GENERATORS (Continued)

ACETYLENE GAS GENERATORS (Continued)

BROWN Mfg. Co., John W., Columbus, O.
(See page 259.)

CASTLE Lamp Co., Amesbury, Mass.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Handy."
(See page 253.)

ECO Mfg. Co., 53 State St., Boston, Mass. "Elliott."
(See page 363.)

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 257.)

ELLIOTT—See Eco Mfg. Co.

GRAY & Davis, Amesbury, Mass.
(See page 255.)

HANDY—See Dietz Co.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HINE-WATT Mfg. Co., 45-49 Randolph St., Chicago, Ill. "Columbia."

HOFACKER Mfg Co., 553-55 W. 42d St., New York, N. Y.
(See page 257.)

KNICKERBOCKER Brass Goods Co., 124th St. & First Ave., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

PITTSBURGH Lamp, Brass & Glass Co., Pittsburgh, Pa.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 749.)

SAXON Lamp Co., 526-32 W. 28th St., New York, N. Y.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SOLAR—See Badger Brass Mfg. Co.

STANDARD Electric Works, 1300 12th St., Racine, Wis. "Arnold."

STERLING Machine & Stamping Co., Wellington, O.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

WESTBROOK—See Kimball Co.

MOTOR CYCLE ACETYLENE GENERATORS

B. & L. Auto Lamp Co., 507-09 W 35th St., New York, N. Y.
(See page 259.)

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn. "Old Sol."
(See page 673.)

HINE-WATT Mfg. Co., 45-49 Randolph St., Chicago, Ill.

NEVEROUT—See Rose Mfg. Co.

OLD SOL—See Hawthorne Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

GLASS

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(For use in Glass Fronts and Wind Shields)

MISSISSIPPI Wire Glass Co., 115 Broadway New York, N. Y.

GLASSES

GAUGE AND LUBRICATOR GLASSES

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

LIPPINCOTT Glass Co., Alexandria, Ind.

MONCRIEFF—See Rogers Co., H. A.

ROGERS Co., H. A., 19 John St., New York, N. Y. (Importers) "Moncrieff."
(See page 213.)

MARINE GLASSES, BINOCULARS AND TELESCOPES

AUDEMAIR—See Spencer Optical Co.

GOERZ American Optical Co., C. P., 317 E. 34th St., New York, N. Y.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

SPENCER Optical Co., 5-7 Maiden Lane, New York, N. Y. "Audemair."

GLIDERS

BURGESS Co. & Curtis, Marblehead, Mass.

PENN Aero Construction Co., Philadelphia Driving Park, Philadelphia, Pa.

WITTEMAN, C. & A., 17 Ocean Terrace, Stapleton, N. Y.

GLOVES

MOTORISTS GLOVES AND GAUNTLETS

ADIRONDACK—See Spear-Martin Fur Co.

ALLEN & Sons, John C., Gloversville, N. Y.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AMERICAN Glove Co., 2013 Churchill St., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 22.

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TOOLS AND SUPPLIES

SOLE AGENTS FOR THE UNITED STATES

Moncrieff's Scotch Gauge Glasses

Glass Tubes (with or without red line), Cylindrical Glasses, Lubrication Glasses.

Belting, Bolts, Pipe and Fittings, Files, Hose, Lubricators, Packing, Stocks and Dies, Waste, Wrenches, etc.

H. A. ROGERS CO., 19 John St., NEW YORK

GRINNELL VENTILATED "RIST-FIT" GLOVES

PATENTED

GRINNELL "RIST-FIT" auto gauntlets possess certain superior features that instantly recommend them to the most particular motorist. **FIT:** The gloves are shaped to fit the hand closely, permit freest hand and finger action and perfect control of levers and steering gear. The Patent "Rist-Fit" improvement allows the gloves to be drawn snugly about the wrist, keeping the gauntlets up, and effectually excluding all dust, dirt, snow, etc. **DURABILITY:** Grinnell Auto Gloves are made from especially tanned "reindeere," colt skin and dog skin leathers, so tough and durable as to give **double the wear** of the ordinary sort. **STYLE:** They are distinctly smart in appearance and made up in both men's and women's sizes. **COMFORT:** The Grinnell Ventilated Auto Gloves for Summer are made with small perforations in the back which keep the hands cool, prevent perspiration and give elasticity to the gloves. **PRICE:** These gloves are sold to retail from $2.50 to $7.50 per pair. Write for prices and samples to-day. Electroplates for advertising and catalogue purposes on application.

MORRISON-RICKER MFG. CO.
72 Broad Street, Grinnell, Iowa

"AGNER'S SIMPLEX" GREASE AND OIL GUN

A fully nickel plated and well-finished article.

This gun has several valuable and exclusive features, one of the most convenient of which is the method of filling. Simply remove the nozzle end, insert the gun in the filler sleeve and thrust the end well into the grease. Slowly pull out the plunger and the gun will fill, after which, withdraw the gun from the sleeve and screw on the nozzle end. This will leave the gun absolutely clean and it will be readily seen that it is thus filled without soiling the hands or clothing.

The sleeve may be left in or by the grease can, or if it is desired to carry the gun in the car, may be wiped off and replaced on the barrel of the gun and nozzle end screwed on with the sleeve in place.

For forcing out the grease, the ratchet handle is used in the form of an ordinary pump handle. The most convenient method ever embodied in a grease gun.

Another feature of this gun is that the nozzles are screwed on ¼-inch pipe thread. Just above this is a ½-inch pipe thread and on the end of the straight nozzle is an ⅛-inch pipe thread, thus the gun may be readily screwed into a filler opening and the grease forced directly into the bearing.

½ lb. size, complete, with two nozzles, each..... $3.00
1 lb. size, complete, with two nozzles, each..... 4.50

RAYMOND C. AGNER CO., - BURLINGTON, WIS.

Incorporated 30,000

No. B—1.

COLT'S

Light and Powerful

Automobile

JACKS

Eccentric clamps and Screw clamps for wood workers. Time savers.

Ask for Catalog No. 170

BATAVIA CLAMP CO.
131 Center St., BATAVIA, N. Y.

No. A—1.

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GLOVES (Continued)

MOTORISTS' GLOVES AND GAUNTLETS (Continued)

AUTO Glove Co., Greenville, Mich.

BELOIT Glove & Mitten Co., Cross & Back Sts., Beloit, Wis.

BLACK GHOST—See Heagle, James.

BOSS Mfg. Co., 351 W. Broadway, New York, N. Y.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

DEERSKIN Glove Co., 4 Middle St., Gloversville, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

EISENDRATH Glove Co., Armitage & Elston Ave., Chicago, Ill.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis. "Kantryp."

FREMONT Mitten & Glove Co., Fremont, O.

FRIED-OSTERMANN Co., Rockford, Ill. "Price."

GLOVERSVILLE Glove Co., Gloversville, N. Y.

GRINNELL—See Morrison-Ricker Mfg. Co.

HANSEN Mfg. Co., O. C., 355 E. Water St., Milwaukee, Wis.

HEAGLE, James, First Ave. & Market St., Johnstown, N. Y. "Black Ghost."

KANTRYP—See Ellsworth & Thayer Mfg. Co.

M. & E. Mfg. Co., Ashland, O.

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

MORRISON-RICKER Mfg. Co., 72 Broad St., Grinnell, Ia. "Grinnell," "Rist-Fit."
(See page 213.)

NORTHRUP—See Syracuse & Eldridge Glove Co.

PONTIAC Knitting Co., Pontiac, Mich.

PRICE—See Fried-Ostermann Co.

RIPON Knitting Works, Ripon, Wis.

RIST-FIT—See Morrison-Ricker Mfg. Co.

SCANDINAVIAN Fur & Leather Co., 16 W. 33d St., New York, N. Y.

SOUTHERN California Glove Co., Hawthorne, Cal.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SYRACUSE & Eldridge Glove Co., 924 S. Salina St., Syracuse, N. Y. "Northrup."

WALLACE Co., Hugh, Boulevard & Orleans St., Detroit, Mich.

GLUE

MARINE GLUE

AMBROID—See West Mfg. Co.

BOSTON Glue Co., 38 Kilby St., Boston, Mass.

FERDINAND & Co., L. W., 201 South St., Boston, Mass. "Jefferys."

GROSHE, Bruno & Co., 39 Jones Lane, New York, N. Y.

JEFFERYS—See Ferdinand & Co.

SIEMON & Elting, 93-95 Nassau St., New York, N. Y.

WEST Mfg. Co., 350 Broadway, New York, N. Y. "Ambroid."

GOGGLES

MOTORISTS GOGGLES AND EYE SHIELDS

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers). "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

BOSTON—See Texas Co.

CHICAGO Eye Shield Co., 134 S. Clinton St., Chicago, Ill.

CONSOLIDATED Optical Mfg. Co., 321 St. Nicholas Ave., New York, N. Y.

COOKS—See Iowa Optical Co.

COVER—See Sussfield, Lorsch & Co.

EFF & SEE—See Frank & Connett.

EMERSON & Co., H. P., 33 Kingston St., Boston, Mass. "Lamb."

FRANK & Connett, 71-73 Nassau St., New York, N. Y. "Eff & See."

FRIEDLANDER & Bro., Joseph, 8 Maiden Lane, New York, N. Y.

GLOBE Optical Co., Boston, Mass.

GOGGLETTE—See Meyrowitz Mfg. Co.

IOWA Optical Co., New London, Ia. "Cooks."

KING Optical Co., Julius, 10-12 Maiden Lane, New York, N. Y.

LAMB—See Emerson & Co., H. P.

LLOYD Co., A. J., 315 Washington St., Boston, Mass. (Importers.)

MEYROWITZ Mfg. Co., 401-05 E. 31st St., New York, N. Y. "Gogglette."

OPTHALMUSCOPE Co., 437 Dorr St., Toledo, O.

PANAMA—See Texas Co.

REESE, V. Deane, Columbus Savings & Trust Bldg., Columbus, O.

REX—See Texas Co.

SEITZMAN Sons, I., 338 Bowery, New York, N. Y.

SKELTOS—See Texas Co.

SPENCER Optical Co., 5-7 Maiden Lane, New York, N. Y.

SUSSFIELD, Lorsch & Co., 39 Maiden Lane, New York, N. Y. "Cover."

TEXAS Co., 212-14 W. Kinzie St., Chicago, Ill. "Rex." "Boston." "Waldorf." "Skeltos." "Panama."

WALDORF—See Texas Co.

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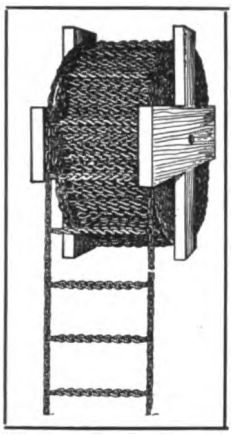
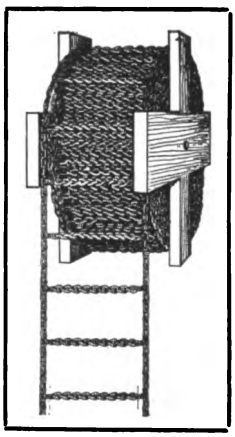


No. 1 Heavy Type
65c per Foot

STANDARD CHAIN GRIPS



No. 2 Light Type
45c per Foot

STANDARD CHAIN TREAD is sold in reels from which *any desired size* can be cut and the attaching fasteners fitted to the same in three minutes' time.

Think of the economy of this method compared to the investment necessary *in pairs* to serve your trade equally well.

Consider also the unequaled quality of *bone-hardened* cross chains used by us exclusively. Much larger, much harder and much longer wearing than any others.

We sell STANDARD chain grips, in pairs, also, and because of the overlapping ends, but *eight* pairs are necessary to fit all of the forty-five sizes of tires now in use.

Price per pair in Bags.

28 x 3 28 x 3½ 28 x 3½	$5.50	36 x 4 36 x 4½ 36 x 5 36 x 5½	$10.50
29 x 3½ 30 x 3 30 x 3½ 30 x 3½ 30 x 4	6.50	37 x 4 37 x 5 37 x 5½ 37 x 6 38 x 5 38 x 5½	12.00
31 x 3½ 31 x 4 32 x 3 32 x 3½ 32 x 4 32 x 4½	7.50	39 x 6 40 x 4 40 x 4½ 40 x 5 40 x 5½ 40 x 6	13.00
33 x 4 34 x 3½ 34 x 4 34 x 4½ 34 x 5	9.00	41 x 6 42 x 3½ 42 x 4 42 x 4½ 42 x 5 42 x 5½ 42 x 6	14.00
35 x 4 35 x 5 36 x 3½	10.50		

Cross Chains for 4 to 6 inch tires.....14c.
3 and 3½ inch tires..... 9c.

Write us for Catalogue and Booklet descriptive of our bone-hardening process. It's decidedly interesting.

STANDARD TRACTION TREAD CO.

Larned and Third Sts., Detroit, Mich.

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GONGS

MECHANICAL GONGS

(See Bells, Mechanical)

SIGNAL GONGS

(For Signaling from Pilot House to Engine Room.)

BEVIN Bros. Mfg. Co., East Hampton, Conn.

EAST Hampton Bell Co., East Hampton, Conn.

GONG Bell Mfg. Co., East Hampton, Conn.

HILL Brass Co., N. N., East Hampton, Conn.

MARINE Hardware Co., Peabody, Mass.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

GRAPHITE

LUBRICATING GRAPHITE

(For Graphite Grease—See Lubricants)

ACHESON Oildag Co., Port Huron, Mich. (See page 217.)

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 217.)

GIRARD Graphite Co., New Bulletin Bldg., Philadelphia, Pa.

INTERNATIONAL Acheson Graphite Co., Niagara Falls, N. Y.

UNITED States Graphite Co., Saginaw, Mich.

WISCONSIN Graphite Co., Stevens Point, Wis.

GREASES

CUP AND GEAR GREASES

ACHESON Oildag Co., Port Huron, Mich. "Gredag." (See page 217.)

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y.

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

ALBANY Lubricating Co., 313 West St., New York, N. Y.

ALEXANDER & Co., H. T., 17 Battery St., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN—See Miller Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Amoilco." (See page 219.)

AMOCO—See American Oil Co.

AMOILCO—See American Oil Co.

ATLANTIC Refining Co., 2 Wise Bldg., Cleveland, O. "Vulcan." (See page 285.)

ATLAS—See Swan & Finch Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTOGREASE—See Ilsley, Doubleday & Co.

AUTOLINE—See Robinson & Son Co.

BANNER—See Clarkson & Ford Co

BANNER—See Cortland Specialty Co.

BARTLES-MAGUIRE Oil Co., 417 Chamber of Commerce, Milwaukee, Wis. "Northland."

BAUM'S Castorine Co., Rome, N. Y.

BELL Oil Co., 51 Ferry St., St. Louis, Mo. "Liberty Bell."

BESLY & Co., Chas. H., Chicago, Ill. "Helmet." (See page 491.)

BLIVEN & Carrington, 116 Broad St., New York, N. Y. "E-Z-Way."

BORNE-SCRYMSER Co., 80 South St., New York, N. Y. "Colo," "Silex." (See page 303.)

BUCK & Co., E. A., Worcester, Mass.

BULLY—See New York Oil & Paint Co.

CATARACT Refining & Mfg. Co., Buffalo, N. Y.

CENTURY—See Zartman Oil Co.

CINCINNATI Oil Works Co., 323 Sycamore St., Cincinnati, O. "Nonfrixo."

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

CLIMAX—See Sweet, Charles F.

CLIMAX-SYNOVIA—See Fiske Bros. Refining Co.

COLO—See Borne-Scrymser Co.

COLUMBIA Lubricants Co. of New York, 116 Broad St., New York, N. Y. "Monogram."

CONNECTICUT Oil Co., Waterbury, Conn.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

CRANE & Co., 91 Oliver St., Boston, Mass. "Eureka."

CRESCENT Oil Co., 602 W Pratt St., Baltimore, Md.

CROWN—See Kellogg & Co.

CURRY Bros. Oil Co., 284 Franklin St., Boston, Mass. "Superba."

DEARBORN Drug & Chemical Works, Chicago, Ill.

DIAMOND CROSS—See Auto Oil Co.

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 217.)

DUFFY Grease Co., 507 W. 30th St., New York, N. Y.

E-Z-WAY—See Bliven & Carrington.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine." (See page 217.)

EAGLEINE—See Eagle Oil & Supply Co.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

EMPIRE—See Richardson Lubricating Co.

EUREKA—See Crane & Co.

EXCELSIOR—See Kellogg & Co.

EXCELSIOR—See Miller's Sons.

FIAT—See Pennsylvania Oil Works Co.

FIBROVISCOS—See Sheppard, W. S.

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The lubricant Harry F. Grant used when he won the Vanderbilt Cup. It contains Deflocculated Acheson Graphite in suspension. No Automobile, Motor Boat, Motorcycle, Commercial Vehicle or other gas engine unit is run at highest efficiency without it. It is the **world's greatest lubricant.** An invention of Edward G. Acheson, Sc.D., the value of whose scientific work is recognized the world over.

APPROVED BY THE AUTOMOBILE CLUB OF AMERICA. After practical application and test, the Special Graphite Committee and Technical Committee of the Automobile Club of America reported that it **increases the efficiency of the engine—Decreases the smoke from the exhaust—Decreases the quantity of lubricating oil—Retains compression in cylinders.** The gas engine is a modern development that needs a modern lubricant—**that lubricant is OILDAG.** Send for Booklet 64A. It will tell you more about Oildag.

ACHESON OILDAG COMPANY, - - Port Huron, Mich.

EAGLEINE AUTO CYLINDER OILS

C THAT K NO-KARBON C THAT K

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A positive no carbon oil has become a necessity, a convenience and a pleasure. We guarantee Eagleine No-Karbon to give satisfaction in every way. If you are not using our oil, will you try a better oil than you are now using?

EAGLE OIL & SUPPLY CO. Boston, Mass.

Dixon's

Ticonderoga Flake

Graphite

For Motors

A number of special graphite lubricants for motor cars are prepared by the Dixon Company. The uses and merits of each or all will be explained to those writing to us. We list two:

Dixon's Motor Graphite

An especially fine grade of flake graphite for cylinders, gears, clutches, etc., to be used with oil.

Dixon's No. 688

A graphited wood grease used with marked success for enclosed transmission gears.

Joseph Dixon Crucible Co.,

Jersey City, N. J.

FOR LUBRICATION USE

HAVOLINE OIL

"It Makes a Difference"

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Climax-Synovia" and "Phoenix."

FULCRUM Oil Co., Franklin, Pa.

GEOGHAN & Son, A., 207 Newell St., Brooklyn, N. Y. "Great Arrow." (See page 461.)

GOLD MEDAL—See Monarch Mfg. Co.

GRAND PRIX—See Alexander & Co.

GREAT ARROW—See Geoghan & Son.

GREOIL—See Robinson & Son Co.

GREDAG—See Acheson Oildag Co.

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. (See page 307.)

HARRIS & Co., Emer E., 2 Maurice St., Buffalo, N. Y.

HAVOLINE Oil Co., 133 William St., New York, N. Y. (See page 217.)

HAVOLINE—See Indian Refining Co.

HAWS, George A., 62 Pine St., New York, N. Y. "Panhard." (See page 305.)

HELMET—See Besly & Co.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y. "Autogrease."

IMPERIAL—See Oil City Oil & Grease Co.

INDIAN Refining Co., Cincinnati, O. "Havoline."

INVADER—See Kellom & Co.

KANTER Co., R. J., 647 Water St., New York, N. Y.

KAUFMAN Oil & Grease Co., L., Pittsburg, Pa. "Premium."

KELLOGG & Co., E. H., 243-44 South St., New York, N. Y. "Crown." "Excelsior."

KELLOM & Co., Chas. F., 113 Arch St., Philadelphia, Pa. "Invader."

KENDALL Refining Co., Bradford, Pa. "Royal." (See page 387.)

KEYSTONE Lubricating Co., 21st & Clearfield Sts., Philadelphia, Pa.

KILNOYS—See Miller Co.

KINCAID Oil Co., 219-21 W. Exchange St., Providence, R. I.

LIBERTY BELL—See Bell Oil Co.

M. C.—See Mound City Oil & Supply Co.

McLEAN-JONES Oil & Supply Co., 65 Long Wharf, Boston, Mass. "Swastika."

MANHATTAN Oil Co., 51 Front St., New York, N. Y.

MICAFLAKE—See United States Mica Co.

MILLER Co., Wm. P., 244-50 Greene St., Brooklyn, N. Y. "American." "Kilnoys."

MILLER'S Sons, Wm. P., 12th St., Long Island City, N. Y. "Excelsior." (See page 305.)

MONARCH Mfg. Co., Council Bluffs, Iowa. "Gold Medal."

MONOGRAM—See Columbia Lubricants Co.

MOTORLUBE—See Tygert Co.

MOUND City Oil & Supply Co., 202 N. Commercial St., St. Louis, Mo. "M.C."

NATIONAL Oil & Supply Co., Essex & First Sts., Harrison, N. J. "Viscos."

NEW York Oil & Paint Co., 128 Maiden Lane, New York. "Bully."

NEW York & New Jersey Lubricant Co., 165 Broadway, New York, N. Y. "Non-Fluid."

NOBETR—See Sawyer Oil Co.

NON-FLUID—See New York & New Jersey Lubricant Co.

NONFRIXO—See Cincinnati Oil Works Co.

NORTHLAND—See Bartles-Maguire Oil Co.

NORTHWESTERN Chemical Co., Marietta, O.

OIL City Oil & Grease Co., Oil City Trust Bldg., Oil City, Pa. "Imperial."

OILZUM—See White & Bagley Co.

PANHARD—See Haws, Geo. A.

PARAGON Refining Co., Front St., Toledo, O. "Polar."

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PENN Oil & Supply Co., 1110-20 N. Branch St., Chicago, Ill.

PENNSYLVANIA Oil Works Co., 72 Front St., New York, N. Y. "Flat." "Zenith."

PERFECTION—See Wood Co.

PERFECTO—See Young & Kimball.

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLEUM Products Co., 3600 Grant Blvd., Pittsburg, Pa. "Sound-Proof." (See page 219.)

PHILADELPHIA Grease Mfg. Co., 848-50 S. Swanson St., Philadelphia, Pa.

PHOENIXO—See Fiske Bros. Refining Co.

POLAR—See Paragon Refining Co.

POLARINE—See Standard Oil Co.

PREMIUM—See Kaufman Oil & Grease Co.

RICHARDSON Lubricating Co., Quincy, Ill. "Empire."

ROYAL—See Kendall Refining Co.

ROBINSON & Son Co., Wm. C., 1501-07 Thames St., Baltimore, Md. "Autoline." "Greoil."

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Nobetr."

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "Fibroviscos."

SILEX—See Borne-Scrymser Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 367 Atlantic Ave., Boston, Mass.

STANDARD Oil Co., 26 Broadway, New York, N. Y. "Polarine." (See back cover.)

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

SUPERBA—See Curry Bros. Oil Co.

SUPERIOR Oil Co., Wade Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

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"Made for the Purpose"

Note Its Purity

LIGHT,

MEDIUM or HEAVY

American Oils are light in color and lubricate thoroughly without leaving a carbon deposit—that's why they are popular. We solicit your inquiries.

Yours truly

AMERICAN OIL CO.

JACKSON, MICHIGAN

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Get Better OIL and Stop That Engine Trouble!

DON'T buy oil or grease unless you know they *cannot be improved.*

NON-CARBONIZING NUMBER "30" CYLINDER OIL A SOUND PROOF LUBRICANT FOR MOTOR-CARS

A SOUND PROOF Non Carbonizing Motor Oil

3 Grades—*BRIGHT, MEDIUM, VISCOUS*

AUTOMOBILE SOUND PROOF LUBRICANTS

For every condition, in every size package.

A request will bring you prices. F.O.B. your city. **Try F. K. 4 Gear Grease.** If you are prompted to give us your order, there is a relationship established that *compels* us to take proper care of you.

Send for Gasoline Tank Gauge, Free to You.

Petroleum Products Co., 3600-10 Grant Boulevard PITTSBURGH, PA.

Sole Producers of Vigorite Gasoline & SOUND PROOF Lubricants

YOU HAVE NO ENGINE TROUBLE

When using the G. L. AUTO OILS

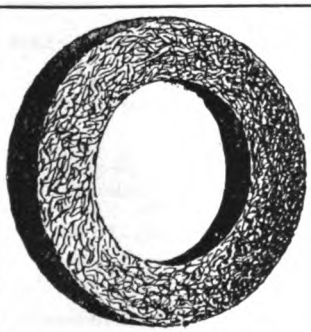
LIGHT, MEDIUM AND HEAVY

Oil that is free from carbonizing properties and best adapted for AUTO CYLINDERS, transmissions and differentials lubrication.

With G. L. Auto oils in use, you have fewer repair bills, you go faster and further at a much lower cost, and there is less wear and tear on your engine.

GENERAL LUBRICATING OIL CO.

1777 Broadway, New York City



TRADE MARK

FELT PACKINGS

for all lubricating and dust excluding purposes.

Prompt Deliveries **Correspondence Solicited**

Manufactured by

GEO. W. BRAUNSDORF

232 and 234 E. 43d St. **NEW YORK**

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

SWASTIKA—See McLean-Jones Oil & Supply Co.

SWEET, Chas. F., 20 Ford St., Hartford, Conn. "Climax."

TOCO—See Tropical Oil Co.

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O. "Toco."

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

UNITED States Graphite Co., Saginaw, Mich.

UNITED States Mica Co., 234 S. LaSalle St., Chicago, Il. "Micaflake." (See page 655.)

UNIVERSAL—See Young & Kimball.

VACUUM Oil Co., Rochester, N. Y. (See pages 301 and 302.)

VELVET—See Sutherland & Co.

VISCOS—See National Oil & Supply Co.

VULCAN—See Atlantic Refining Co.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Oilzum."

WHIZ—See Hollingshead Co.

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection."

YOUNG, Orlando W., 180 Freylinghuysen Ave., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Universal." "Perfecto."

ZARTMAN Oil Co., J. V., 120 S. Meridian St., Indianapolis, Ind. "Century."

ZENITH—See Pennsylvania Oil Works Co.

GRIPS

MOTOR CYCLE HANDLE BAR GRIPS

AMERICAN Enamel Co., Providence, R. I "Mascot."

G. & J. Tire Co., Indianapolis, Ind.

MASCOT—See American Enamel Co.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MOTOR CYCLE NIPPLE GRIPS

MENOMINEE Electric Mfg. Co., Menominee, Mich.

THROTTLE AND SPARK LEVER GRIPS

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

GROMMETS

GROMMETS AND EYELETS

STIMPSON & Son, Edwin B., 31 Spruce St., New York, N. Y.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

GUARDS

CHAIN GUARDS

SORENSEN Chain Guard & Silencer Co., 1712 Michigan Ave., Chicago, Ill.

HORN BULB GUARDS

NEW York Wire & Spring Co., 586 Washington St., New York, N. Y.

MOTOR CYCLE CHAIN GUARDS

CLARK & Son, A. N., Plainville, Conn.

MOTOR CYCLE MUD GUARDS

MOTT Wheel Works, Utica, N. Y. (See page 699.)

STANDARD Welding Co., Cleveland, O. (See page 603.)

UNITED States Wheel & Rim Co., St. Anne, Ill.

MUD GUARDS AND FENDERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

ACME Veneer & Body Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 91.)

ANCHOR Auto Parts Mfg. Co., 523 W. 45th St., New York, N. Y.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Radiator Repairing Co., 1317 Vine St., Philadelphia, Pa.

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.

AUTOMOBILE Supply Co., 547 W. 59th St., New York, N. Y. (See page 673.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BECKER, Wm., 153 Second St., Hoboken, N. J.

BRIDGEPORT Vehicle Co., Holland & Fairfield Aves., Bridgeport, Conn.

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

BUSH Mfg. Co., Hartford, Conn. (See page 697.)

COLUMBUS Auto Brass Co., Columbus, O. (See page 255.)

DANN Bros. & Co., 30-38 Franklin St., New Haven, Conn.

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DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

DOMINION Stamping Co., Walkerville, Ont., Can.
(See page 221.)

FEDDERS Mfg. Works, 55 Tonawanda St., Buffalo, N. Y.
(See page 281.)

FOLSOM Mfg. Co., C. G., 547 Scott St., South Bend, Ind.
(See page 745.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See pages 94 and 95.)

HELSER Sheet Metal Specialty Co., 123 N. Main St., Elkhart, Ind.

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KELLS Mfg. Co., W. J., 726-28 11th Ave., New York, N. Y.
(See page 383.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.
(See page 221.)

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

LAWSON Co., F. H., C. H. & D. Ry. & Wheatly St., Cincinnati, O.

LOCKPORT Stamping Co., Findlay, O.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

METAL Stamping Co., Jackson, Mich.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.
(See page 221.)

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

OFF & Co., Christian, 5 N. New Jersey St., Indianapolis, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 89.)

STERLING Mfg. Co., 611-19 W. 55th St., New York, N. Y.

TOOPS Automobile Hood Co., 1002 Congress Ave., Indianapolis, Ind.

VAN Camp Hardware & Iron Co., Indianapolis, Ind.

WILLIS & Sons Co., 204-06 18th St., Moline, Ill.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

TROUSER GUARDS OR CLIPS

BEVIN Bros. Mfg. Co., East Hampton, Conn.

EAST Hampton Bell Co., East Hampton, Conn.

GUNS

GREASE GUNS

(For forcing grease into gear cases)

AGNER Co., Raymond C., Burlington, Wis. "Simplex."
(See page 213.)

B-LINE—See Randall-Faichney Co.

B & R—See Beckley-Ralston Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "B & R." "Maximus."
(See page 159.)

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

BUSSE Machine Works, 41 Marion St., Brooklyn, N. Y. "Yeagers."

COX Brass Mfg. Co., Albany, N. Y.

CLIMAX Specialty Co., Seneca Falls, N. Y.

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill. "Yankee."
(See page 255.)

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis.
(See page 283.)

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GREESEJAMMER—See Motor Car Supply Co.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HUNT Mfg. Co., 209 E. Second St., Ottumwa, Ia.

KELLOGG Mfg. Co., E. Main & Circle Sts., Rochester, N. Y.

KOKOMO Grease Gun Co., Kokomo, Ind.

LITTLE GIANT—See Neiman Machine Works.

MAXIMUS—See Beckley-Ralston Co.

MILLER & Starr, 1779 Broadway, New York, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill. "Greesejammer."

NEIMAN Machine Works, Freeport, Ill. "Little Giant."
(See page 505.)

NOERA Mfg. Co., Waterbury, Conn.
(See page 635.)

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PIONEER—See Standard Sheet Metal Co.

RANDALL-FAICHNEY Co., 251 Causeway St., Boston, Mass. "B-Line."
(See pages 171 and 669.)

SIMPLEX—See Agner Co.

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GREASE GUNS (Continued)

STANDARD Sheet Metal Co., Passaic, N. J. "Pioneer."

TELL City Foundry & Machine Works, Tell City, Ind.

YANKEE—See Fowler Lamp & Mfg. Co.

YEAGERS—See Busse Machine Works.

OIL GUNS

AGNER Co., Raymond C., Burlington, Wis. "Simplex." (See page 213.)

B-LINE—See Randall-Faichney Co.

B & R—See Beckley-Ralston Co.

BECKLEY-RALSTON Co., Michigan Ave & Randolph St., Chicago, Ill. "B. & R." (See page 159.)

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill. (See page 567.)

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

CLIMAX Specialty Co., Seneca Falls, N. Y.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COX Brass Mfg. Co., Albany, N. Y.

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill. "Yankee." (See page 255.)

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. (See page 283.)

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HASTINGS & Anderson, 45-47 E. Lake St., Chicago, Ill.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. (See page 339.)

KELLOGG Mfg. Co., E. Main & Circle Sts., Rochester, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill. "Oiljammer."

NEVER-MISS Mfg. Co., Lansing, Mich. (See page 421.)

NEW York Coach & Auto Lamp Co., 794-98 10th Ave., New York, N. Y. "Universal."

NOERA Mfg. Co., Waterbury, Conn. (See page 635.)

OILJAMMER—See Motor Car Supply Co.

OMEGA Separator Co., Lansing, Mich. (See page 605.)

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.

RANDALL-FAICHNEY Co., 251 Causeway St., Boston, Mass. "B-Line." (See pages 171 and 669.)

SIXPLEX—See Agner Co.

UNIVERSAL—See New York Coach & Auto Lamp Co.

YANKEE—See Fowler Lamp & Mfg. Co.

HAIR

UPHOLSTERY HAIR

ARMOUR Curled Hair Works, 31st Pl. & Benson Sts., Chicago, Ill.

BENTLEY Hair Co., Joseph, Methuen, Mass.

DELANY & Co., 209 N. Third St., Philadelphia, Pa.

GORDON Bros., Pierce & Orthodox Sts., (Frankford), Philadelphia, Pa.

ILLINOIS Leather Co., 930 N. Halsted St., Chicago, Ill.

MITCHELL Co., P. R., Spring Grove & Harrison Aves., Cincinnati, O.

WILKENS Co., Wm., Frederick Ave. & Wilkens St., Baltimore, Md

WILLCOMB & Co., Geo., 60 Chardon St., Boston, Mass.

WOLL & Co., F. P. (Frankford), Philadelphia, Pa.

WOLL & Sons Mfg. Co., Peter, Hancock & Berks Sts., Philadelphia, Pa.

HAMPERS

TOURING HAMPERS, BASKETS AND LUNCH BOXES

(See also Trunks, Automobile)

AMESBURY Reed & Rattan Co., Bailey Bldg., Amesbury, Mass.

BURLINGTON Basket Co., Burlington, Ia.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

SEITZ, C., 512 Third Ave., New York, N. Y.

HANDLES

DOOR HANDLES

AETNA BRASS Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich. (See page 351.)

BRAINERD Mfg. Co. (E. Rochester), Rochester, N. Y.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. (See page 351.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

ENGLISH & Mersick Co., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

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HANDLES (Continued)

DOOR HANDLES (Continued)

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

LOCKWOOD Co., 34 Mechanic St., Newark, N. J.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NORTH & Judd Mfg. Co., New Britain, Conn.

NOVELTY Mfg. Co., Waterbury, Conn.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

PHOENIX Lock Works, 321-27 Third Ave., Newark, N. J.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.
(See page 351.)

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

STRONG, M. H., 168 South Ave., Rochester, N. Y.
(See page 439.)

UNION Brass Works, 355-63 Harper Ave., Detroit, Mich.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

STARTING CRANK HANDLES

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

HANGERS

HAT HANGERS

(Clip for hanging hats on robe rails)

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

LICENSE HANGERS

(See Holders, License; also Numbers, License)

MOTOR CYCLE CRANK HANGERS

A. & J. Mfg. Co., 427 W. Randolph St., Chicago, Ill.

FAUBER—See Great Western Mfg. Co.

GREAT Western Mfg. Co., La Porte, Ind. "Fauber."

PRESSED STEEL STEP HANGERS

BOSSERT Co., Utica, N. Y.
(See page 755.)

CROSBY Co., Buffalo, N. Y.
(See page 227.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 243.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HASSOCKS

AUTOMOBILE HASSOCKS

(For Metal Foot Rests—See Rests, Foot)

CHICAGO Hassock Co., 561 State St., Chicago, Ill.

HEADLIGHTS

ACETYLENE HEADLIGHTS

(Lamps, Acetylene)

ELECTRIC HEADLIGHTS

AVERY Portable Lighting Co., Milwaukee, Wis. "Electrobola."

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J."
(See page 257.)

E & J—See Edmunds & Jones Mfg. Co.

ELECTRIC STAR—See Milwaukee Bronze Casting Co.

ELECTROBOLA—See Avery Portable Lighting Co.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill.
(See page 255.)

GILMORE Arc Headlight Co., 2228 Michigan Ave., Chicago, Ill.

H. & H.—See Hammer & Hull.

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER & Hull, 1839 Euclid Ave., Cleveland, O. "H. & H."

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.
(See page 257.)

MILWAUKEE Bronze Casting Co., 119 Clinton St., Milwaukee, Wis. "Electric Star."

O'BRIEN Electrophone Co., Hallowell, Me.

SPRAGUE-WALDO Mfg. Co., 19-23 Harper Ave., Detroit, Mich.
(See page 255.)

SUN Lamp Co., 1905 Sunnyside Ave., Chicago, Ill.

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AUTOMOBILE HEATERS

AL-TON Motor Accessory Co., South & High Sts., Akron, O.
(See page 201.)

AMERICAN Auto Heater Co., 160 14th St., Buffalo, N. Y.

CHICAGO Flexible Shaft Co., 154 La Salle Ave., Chicago, Ill. "Duchess." "Clark."

CINCINNATI Auto Heater Mfg. Co., 115 E. Liberty St., Cincinnati, O.

CINCINNATI Pump Co., Liberty & Clay Sts., Cincinnati, O.

CLARK—See Chicago Flexible Shaft Co.

DUCHESS—See Chicago Flexible Shaft Co.

ENSMINGER, Chas. C., 107 S. Harrison St., Shelbyville, Ind.

LEHMAN Bros., 10 Bond St., New York, N. Y. "Queen," "Star."

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radio."
(See page 615.)

MOTOR & Mfg. Works Co., Geneva, N. Y. "Rational."
(See page 295.)

NATIONAL Casket Co., 381-85 Wabash Ave., Chicago, Ill.

QUEEN—See Lehman Bros.

RADIO—See Milwaukee Auto Specialty Co.

RATIONAL—See Motor & Mfg. Works Co.

STANDARD Stamping Co., Marysville, O.

STAR—See Lehman Bros.

FEED WATER HEATERS

NATIONAL Pipe Bending Co., New Haven, Conn.
(See page 161.)

OFELDT & Sons, F. W., Nyack, N. Y.

WHITLOCK Coil Pipe Co., Hartford, Conn.

RADIATOR HEATERS

CONSOLIDATED Car Heating Co., Singer Bldg., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

HINGES

CABINET HINGES

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

READING Hardware Co., Reading, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

STANLEY Works, Lake St., New Britain, Conn.

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y.
(See page 267.)

DOOR HINGES

BRAINERD Mfg. Co. (E. Rochester), Rochester, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 635.)

ENGLISH & Mersick Co., New Haven, Conn.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

NORTH & Judd Mfg. Co., New Britain, Conn.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

SOSS Mfg. Co., 435 Atlantic Ave., Brooklyn, N. Y.

WAINWRIGHT & Son, W. W., 16th St. & Western Ave., Connersville, Ind.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

HOOD HINGES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

BRONSON Co., Homer D., Beacon Falls, Conn.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

WATERBURY Brass Goods Corp., Washington Ave., Waterbury, Conn.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

HOISTS

PORTABLE HOISTS

(See Cranes, Portable)

HOLDERS

BATTERY HOLDERS

(See also Boxes, Battery)

BRANDON—See Wireless Battery Box Co.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Hermetic."

HERMETIC—See Campbell Co.

MASON—See Sumter Telephone Mfg. Co.

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BATTERY HOLDERS (Continued)

PATTERSON--See Stanley & Patterson.

STANLEY & Patterson, 23 Murray St., New York, N. Y.

SUMTER Telephone Mfg. Co., Sumter, S. C. "Mason."

WIRELESS Battery Box Co., Toledo, O. "Brandon."

BOUQUET HOLDERS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.)

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

ENGLISH & Mersick Co., New Haven, Conn.

GOODWIN & Kintz Co., Winsted, Conn.

HAWKES & Co., T. G., Corning, N. Y.

HOLT & Beebee, 40 Sudbury St., Boston, Mass. (See page 257.)

INTERNATIONAL Silver Co., Meriden, Conn.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

SENECA Glass Co., Morganstown, W. Va.

STEUBEN Glass Works, Corning, N. Y.

LICENSE HOLDERS

AUTOMOBILE License Indicator Co., Lewisburg, Tenn. "Perfection."

BALZER Co., Gus., 1777 Broadway, New York, N. Y.

CORYELL Co., 18 S. Warren St., Trenton, N. J.

ESSANAR Co., 523 Eighth Ave., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

NORTHERN Machine Co., 20th & Dauphin Sts., Philadelphia, Pa. "Schell."

PERFECTION—See Automobile License Indicator Co.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass. (See page 351.)

ROCH-O—See Rochester Timer Co.

ROCHESTER Timer Co., 203 State St., Rochester, N. Y. "Roch-O."

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

SCHELL—See Northern Machine Co.

SURE Number Lamp Co., 140 Nassau St., New York, N. Y.

MOTOR CYCLE HANDLE BAR WATCH HOLDERS

ADAMS Co., Henry T., 6823 S. Chicago Ave., Chicago, Ill. "Quick Action."

MUELLER, L. J., 6417-21 Woodland Ave., Cleveland, O.

QUICK ACTION--See Adams Co.

OIL CAN HOLDERS

DAYTON Malleable Iron Co., Dayton, O.

HALLADAY Co., L. P., 1469 Michigan Ave., Chicago, Ill. "Universal."

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

UNIVERSAL—See Halladay Co.

STARTING CRANK HOLDERS

CARTER Co., Geo. R., 1600-20 Kentucky Ave., Connersville, Ind. (See page 687.)

DIAMOND—See Gilbert Mfg. Co.

ECONOMY Stay Co., 1017 Lucas Ave., St. Louis, Mo.

FEESER Co., Frank S., 1104 Prospect St., Indianapolis, Ind.

GILBERT Mfg. Co., New Haven, Conn. "Diamond."

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

MOORE & Steinford, 2317 State St., Chicago, Ill. (See page 441.)

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y. (See page 441.)

PERKINS-CAMPBELL Co., Cincinnati, O. (See page 411.)

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y. (See page 441.)

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

VAUGIER Mfg. Co., Wayne St. & P. R. R., Piqua, O.

TIRE HOLDERS

(For carrying spare tires on car)

A. B. C.—See Motor Car Supply Co.

ACME—See Cox Brass Mfg. Co.

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. (See page 121.)

AMCO—See Chicago Electric Mfg. Co.

AREMCO—See Rothstein Mfg. Co.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich. (See page 351.)

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Monarch." (See page 159.)

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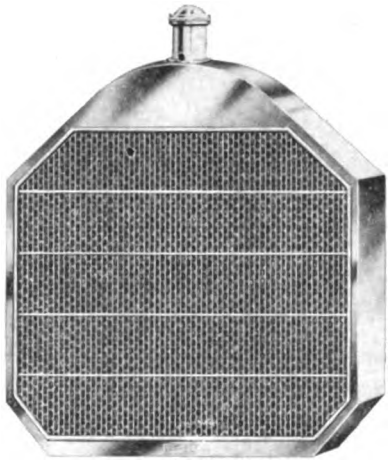
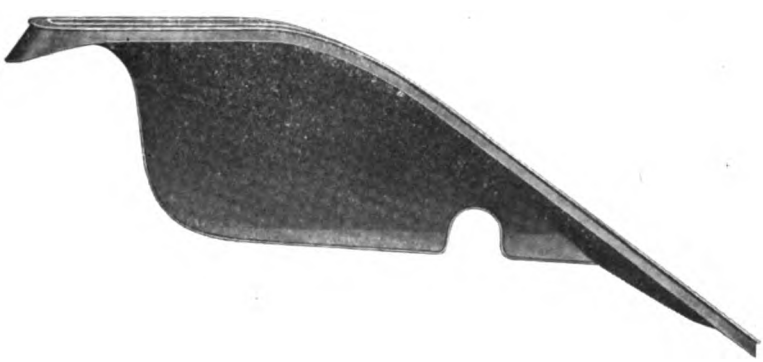


NOVELTY RADIATORS

Will be ready for March delivery. They are the lightest and strongest Radiators of the cellular type, and the easiest repaired. Write us for further particulars.



Fenders, Hoods, Tanks, Drip Pans, in fact all sheet metal work, guaranteed to suit the most exacting purchasers. We are prepared to furnish large quantities or small quantities on short notice. Send us your B-Ps and let us submit figures. Nickel Plating and Brass Plating a specialty.

Novelty Manufacturing Co.

Jackson, Michigan

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HOLDERS (Continued)

TIRE HOLDERS (Continued)

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill. (See page 567.)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy." (See page 61.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

COX Brass Mfg. Co., Albany, N. Y. "Monarch," "Duplex," "Acme."

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DIAMOND—See Gilbert Mfg. Co.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

DUPLEX—See Cox Brass Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. (See page 283.)

GARRETT, Miller & Co., Fourth & Orange Sts., Wilmington, Del.

GILBERT Mfg. Co., New Haven, Conn. "Diamond." "Star."

HANDY—See Chicago Electric Mfg. Co.

HANS Motor Equipment Co., La Crosse, Wis. (See page 187.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HERCULES—See Western Brass Mfg. Wks.

HIGHTON & Sons Co., Wm., Nashua, N. H.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

LANDON, John S., 524 W. Beardsley Ave., Elkhart, Ind.

LUND-SMITH Co., 51 Goodwin St., Paterson, N. J.

MEDINA Machine & Stamping Co., Medina, N. Y.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium." (See page 615.)

MONARCH—See Beckley-Ralston Co.

MONARCH—See Cox Brass Mfg. Co.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill. "A. B. C."

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

NOONAN Tool & Machine Works, A. S. 105 E. Dow St., Rome, N. Y.

NOVELTY Mfg. Co., Waterbury, Conn.

PHILADELPHIA Novelty Supply Co., 2021-33 N. 29th St., Philadelphia, Pa.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RADIUM—See Milwaukee Auto Specialty Co.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass. (See page 351.)

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

STAR—See Gilbert Mfg. Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STRYKER, C. W., 608 Snow Bldg., Syracuse, N. Y. (See page 451.)

SUTHERGREEN, F. S., Manchester, Mass.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

UNIVERSAL—See New York Coach & Auto Lamp Co.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. "Hercules." (See page 633.)

WATCH HOLDERS

(See also Clocks, Dashboard)

ADAMS Co., Henry T., 6823 S. Chicago Ave., Chicago, Ill. "Quick Action."

COWLES & Co., C., New Haven, Conn. (See page 351.)

ENGLISH & Mersick Co., New Haven, Conn.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. (See page 283.)

METAL Specialties Mfg. Co., 427-41 Randolph St., Chicago, Ill.

O'BRIEN & Co., Jos., F., 63 Park Pl., New York, N. Y. (See page 439.)

QUICK ACTION—See Adams Co.

SIMPLEX—See Sterling Mfg. Co.

STERLING Mfg. Co., Staunton, Va. "Simplex."

HOODS

MOTOR HOODS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AEPINUS-HAGGSTROM Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

ANCHOR Auto Parts Mfg. Co., 528 W. 45th St., New York, N. Y.

AUTO Radiator Repairing Co., 1317 Vine St., Philadelphia, Pa.

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.

AUTOMOBILE Supply Co., 547 W. 59th St., New York, N. Y. (See page 673.)

BADGER & Sons Co., E. B., 68-69 Pitts St., Boston, Mass.

BECKER, Wm., 153 Second St., Hoboken, N. J.

BEURET Mfg. Co., Auburn, Ind.

BRISCOE Mfg. Co., Detroit, Mich. (See pages 341 and 342.)

BUSH Mfg. Co., Hartford, Conn. (See page 697.)

COLUMBUS Auto Brass Co., Columbus, O. (See page 255.)

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MAYO RADIATORS

If you want a Radiator that is sure to suit you, a Radiator that is worth all it costs, a Radiator that will make good in long service, get a "MAYO." The reputation of "Mayo" Radiators is well founded. The long and successful service of the best American built cars has established this beyond question. Nothing can be said or done that will detract from it. If you do not know the value of "Mayo" quality, ask one of your friends who have used "Mayo" Radiators, or ask us—we can satisfy you.

Largely increased facilities enable us to take on a few new customers of the kind that place quality before price. If you are a Quality Car Maker better write to us at once.

HONEYCOMB-CELLULAR OR FLAT TUBE TYPES

MAYO RADIATOR CO., New Haven, Conn.

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HOODS (Continued)

MOTOR HOODS (Continued)

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

DOMINION Stamping Co., Walkerville, Ont., Can.
(See page 221.)

FEDDERS Mfg. Works, 55 Tonawanda St., Buffalo, N. Y.
(See page 181.)

FOLSOM Mfg. Co., C. G., 547 Scott St., South Bend, Ind.
(See page 745.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See pages 94 and 95.)

HELSER Sheet Metal Specialty Co., 123 N. Main St., Elkhart, Ind.

KELLS Mfg. Co., W. J., 726-28 11th Ave., New York, N. Y.
(See page 383.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.
(See page 221.)

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 383.)

KINWOOD—**See Kinsey Mfg. Co.**

LOCKPORT Stamping Co., Findlay, O.

LONG Mfg. Co., Chicago, Ill.
(See page 697.)

MAYO Radiator Co., New Haven, Conn.
(See page 233.)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.
(See page 221.)

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.
(See page 514.)

OFF & Co., Christian, 5 N. New Jersey St., Indianapolis, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 89.)

STERLING Mfg. Co., 611-19 W. 55th St., New York, N. Y.

TOOPS Automobile Hood Co., 1002 Congress Ave., Indianapolis, Ind.

VAN Camp Hardware & Iron Co., Indianapolis, Ind.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WILLIS & Sons Co., 204-06 18th St., Moline, Ill.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WRIGHT Cooler & Hood Mfg. Co., Muskegon, Mich.

SPARK PLUG HOODS

BURNHAM Spark Plug Co., East Edgecomb, Me.

DAY, Geo. F., 21 Haverhill St., Boston, Mass.

FORBES, Walter J., 70 Long Wharf, Boston, Mass.

HARDY Co., R. E., Austin Ave. & May St., Detroit, Mich.
(See page 631.)

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y.
(See page 323.)

RAJAH Auto-Supply Co., Watsessing Station, Bloomfield, N. J.
(See page 421.)

SPRAY HOODS

ATLANTIC Co., Amesbury, Mass.

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

CARPENTER & Co., Geo. B., 206 S. Water St., Chicago, Ill.

COOLEY Mfg. Co., Waterbury, Vt.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

LINDLEY Co., W. H., Main & Canal Sts., Canastota, N. Y.

LONGDIN - BRUGGER Co., Fond-du-Lac, Wis.

McCLELLAN, Chas. P., Fall River, Mass.

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMAS & Co., Wm. E., 42 South St., New York, N. Y.

TOPPAN Boat Mfg. Co., 25 Haverhill St., Boston, Mass.

WHITE & Co., E. M., Oldtown, Me.

HOOKS

BOAT HOOKS

DURKEE & Co., Chas. D., 2 South St., New York, N. Y.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 349.)

MARINE Hardware Co., Peabody, Mass.

NEPTUNE Hardware Mfg. Co., 54 South St., New York, N. Y.

SNAP HOOKS

AUTO-LOCK Clasp Co., 327 Washington St Buffalo, N. Y.

COVERT Mfg. Co., Troy, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co. New Britain, Conn.

OUGHT-O-SNAP Co., Bryan, O.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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Miller's Automobile Push Button Controller Lock

Mr. Maker, we would like to figure with you. We believe it will do you good and it will do us good. This locks your car from the seat. Your customers would appreciate this locking device as being a part of your car and they would appreciate it when the points are brought out. Put it on your controller lever and your emergency lever. They would appreciate it on both levers and see the value of it if properly explained why it is on both.

It takes but a second to lock and unlock from the seat. Two locks have been tested out for about one year and found perfect. Wholesale prices to Automobile Manufacturers, Garages and Supply Houses on application to T. T. Miller Hardware Co., Sales Agent, 30-32 North Fourth St., Easton, Pa.

No. 1 shows a head complete, with spring to apply to handles, style of No. 2. Screw head on handle as shown in Cut No. 2, and adjust rod by screwing in the base of the lock to the proper distance—this is all. By inserting the key in the top, you can lock and unlock. This style of head is our best. Retail price, complete, put on, $15.00.

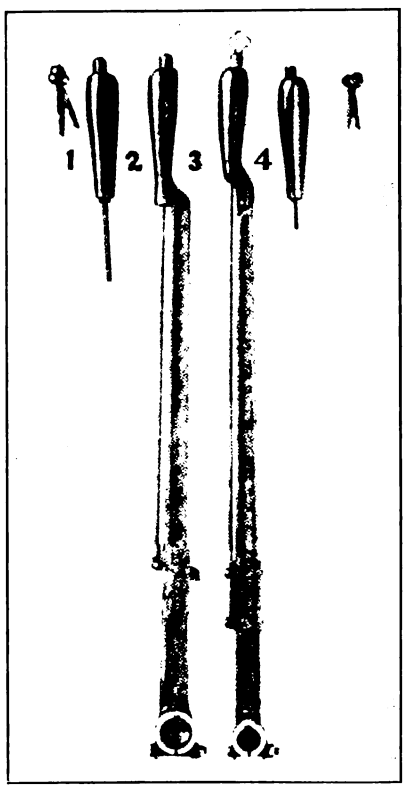
No. 3 style head is same as No. 1, with the exception of the bend, which is fitted on straight handles, as shown in Cut No. 3. Retail price, complete, put on, $15.00.

No. 4 is smaller head and less expensive. The No. 4 will fit the same style handle as No. 2, or bent head can be placed on handle as shown in No. 3. Retail price, put on, $10 00.

The Miller Push Button Controller Lock appeals to the sense of the practical—the mechanical. It is so compact, workmanlike, efficient. It is so all-there and all right. Insist on your new car being equipped with it.

Miller's Lock is making history.

Ask the man who has one on his car.



MILLER'S AUTOMOBILE PUSH BUTTON CONTROLLER LOCK.

Patented June 26, 1910. Patent pending. Patented in Canada, August 9, 1910. Patents pending in England, Germany. France and Belgium.

Length of Heads:
Nos. 1, 2 and 3 are 5¼ inches to 5¾ inches.
No. 4 is 5 inches.

T. T. Miller Hardware Co., SALES AGENT

30-32 North Fourth Street, ∴ EASTON, PA.

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HORNS

BULB HORNS

AUTOMOBILE Supply Mfg. Co., 220-22 Taaffe Pl., Brooklyn, N. Y.
(See page 241.)

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn.
(See page 673.)

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.

POST & Lester Co., 175 Asylum St., Hartford, Conn. (Importers.) "Volier."
(See page 637.)

RILEY-KLOTZ Mfg Co., 17 Mulberry St., Newark, N J.

STANDARD Metal Mfg. Co., Chestnut, Jefferson & Malvern Sts., Newark, N. J.
(See page 775.)

STERLING Machine & Stamping Co., Wellington, O.

VOLIER—See Post & Lester Co.

ELECTRIC HORNS AND HORN BLOWERS

AMERICAN Electric Co., State & 58th Sts., Chicago, Ill. "Sampson."

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

ARNOLD—See Standard Electric Works.

ATWATER Kent Mfg. Works, 44 N. Sixth St., Philadelphia, Pa. "Monoplex."
(See page 747.)

AUTOMOBILE Supply Mfg. Co., 220-22 Taafe Pl., Brooklyn, N. Y. "Newtone."
(See page 241.)

CLYMAX—See Nonpareil Horn Mfg. Co.

DEAN Electric Co., 880 Taylor St., Elyria, O. "Tuto."
(See pages 239 and 240.)

DIXIE—See Edwards & Co.

DUPLEX—See Electric Auto Horn Co.

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Dixie."

ELECTRIC Auto Horn Co., Pittsburg, Pa. "Duplex."
(See page 669.)

ELECTRIC Horn & Specialty Co., Utica, N. Y. "Oneita."
(See page 241.)

ELECTRO-CORNO—See Elkhart Electro-Corno Co.

ELKHART Electro-Corno Co., Commercial St., Elkhart, Ind. "Electro-Corno."

EVER READY—See American Ever Ready Co.

GARY Co., Theo. H., 41 Union Sq., New York, N. Y. "Grack-Unicum."

GRACK-UNICUM—See Gary Co.

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn.
(See page 673.)

JONES Speedometer Co., New Rochelle, N. Y.

KLAXON—See Lovell-McConnell Mfg. Co.

KLAXONET—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Klaxon" "Klaxonette."
(See page 757.)

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

MONOPLEX—See Atwater Kent Mfg. Works.

NEWTONE—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y. "Clymax."

O'BRIEN Electrophone Co., Hallowell, Me.

ONEITA—See Electric Horn & Specialty Co.

RAPID FIRE—See Russell Electric Co.

RUSSELL Electric Co., Danbury, Conn. "Saxon," "Rapid Fire," "Saxonette."

SAMPSON—See American Electric Co.

SAXON—See Russell Electric Co.

SAXONETTE—See Russell Electric Co.

SIRENO Co., 39-41 Cortlandt St., New York, N. Y.

STANDARD Electric Works, 1300 12th St., Racine, Wis. "Arnold."

SWARZ-DETROIT Co., 41 Bates St., Detroit, Mich.
(See page 237.)

TUTO—See Dean Electric Co.

TYPHOON Signal Co., 1389 Milwaukee Ave., Chicago, Ill.
(See page 245.)

ZARAK Mfg. Co., Oshkosh, Wis.

EXHAUST HORNS

(Tube Horns or Chimes and Whistles)

ACORN—See Steel Cable Engineering Co.

AMCO—See Chicago Electric Mfg. Co.

AMERICAN Whistle Co., 16 Wakefield Ave., Buffalo, N. Y.
(See page 477.)

APCO—See Auto Parts Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

AUTOCHIME—See Gray-Hawley Mfg. Co.

AUTOLARM—See Gray-Hawley Mfg. Co.

B & R—See Beckley-Ralston Co.

BARCO Brass & Joint Co., 226 N. Jefferson St., Chicago, Ill.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "B. & R." "Blue Ribbon."
(See page 159.)

BLUE RIBBON—See Beckley-Ralston Co.

CHICAGO Electric Mfg. Co., 523-29 Van Buren St., Chicago, Ill. "Amco."

DONALDSON & Fisher Co., 218-20 W. Kinzie St., Chicago, Ill.

EAGLE Whistle Co., Boston, Mass.
(See page 669.)

ECHO Horn Co., 5601 Carnegie Ave., Cleveland, O.

EXO—See Troy Auto Specialty Co.

FINDEISEN & Kropf Mfg. Co., 2160 S. Rockwell St., Chicago, Ill.

FINANCE Developing Co., 1777 Broadway, New York, N. Y. "Nightingale."

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill. "Howler."
(See page 255.)

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 22.

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The Swarz Electric Reed for Automobiles

The deep tone of the Swarz Electric Reed is unique in an electrical device. Not extreme. An effective, business-like, commonsense notice—"Automobile Coming." Operated with 5 dry cells or storage battery. Our special patented winding gives effective volume of sound with reasonable current consumption and no spark at contact points, which obviates need of adjustment and gives them practically indefinite life. The Swarz Electric Reed was especially designed to be attached to any standard American make of horn.

Reed and highly polished brass horn, with accessories as shown. - - - **$18.00**

Reed, with accessories for attaching to your present horn, **$15.00**

FOR MOTOR BOATS

The fog-horn tone of the Swarz Electric Reed and Swarz design of heavy metal horn give a signal of peculiar effectiveness for marine purposes. The button-operated signal for boats is the acme of convenience. Long or short blasts at will.

The iron horn and standard in dark green enamel, especially treated to withstand weather conditions, maintains a very attractive appearance. No polishing required.

Heavy Iron Horn and Reed, with accessories as shown, and swivel deck stand - - **$19.00**

The same as above, in **Solid Polished Brass** instead of iron - **$20.00**

The Swarz Reed and heavy metal horn, **enameled,** without deck stand, having bracket for attaching to any vertical surface, and accessories as shown - **$18.00**

Delivery Prepaid on Cash with Order.

Dealers! There is a wide demand NOW for a high-grade instrument reasonable both in first cost and maintenance. We alone offer that instrument. WRITE FOR TRADE PRICES, NOW.

SWARZ-DETROIT COMPANY

41 Bates Street **DETROIT, MICHIGAN**

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HORNS (Continued)

EXHAUST HORNS (Continued)

GARAGE Equipment Mfg. Co., 712 S. Pierce St., Milwaukee, Wis. "Melody."
(See page 283.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich. "Autochime." "Autolarm."

HOWLER—See Fowler Lamp & Mfg. Co.

HUSK—See Western Brass Mfg. Works.

JERICHO—See Randall-Faichney Co.

JOEY-MELL—See Loose, R. D.

JUBILEE—See Randall-Faichney Co.

LOOSE, R. D., 1407 Michigan Ave., Chicago, Ill. "Joey-Mell."

MELODY—See Garage Equipment Mfg. Co.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium Angelus."
(See page 615.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

NIGHTINGALE—See Finance Developing Co.

RADIUM ANGELUS—See Milwaukee Auto Specialty Co.

RANDALL-FAICHNEY Co., 251 Causeway St., Boston, Mass. "Jericho." "Jubilee."
(See pages 171 and 669.)

RIGHT-O-WAY Co., Caxton Bldg., Cleveland, O.

SCREAM Sales Co., 2724 Michigan Ave., Chicago, Ill.

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

STEEL Cable Engineering Co., 92 State St., Boston, Mass. "Acorn."

TROY Auto Specialty Co., Troy, N. Y. "Exo."
(See page 703.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. "Husk."
(See page 633.)

FOG HORNS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

BIVERSONE Mfg. Co., 3 Rogers St., Gloucester, Mass.

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

LOTHROP & Son, L. D., 70 Duncan St., Gloucester, Mass.

MASON Co., G. H., 150-58 Blackstone St., Boston, Mass.

PERSKY & Co., F., 52 Elizabeth St., New York, N. Y.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

MOTOR CYCLE EXHAUST HORNS AND WHISTLES

BARCO Brass & Joint Co., 226 N. Jefferson St., Chicago, Ill.

FINANCE Developing Co., 1777 Broadway, New York, N. Y. "Nightingale."

NIGHTINGALE—See Finance Developing Co.

SIREN HORNS

O'BRIEN Electrophone Co., Hallowell, Me.

SIRENO Co., 39-41 Cortlandt St., New York, N. Y.

STERLING Machine Co., Norwich, Conn. "Uncas."
(See page 423.)

UNCAS—See Sterling Machine Co.

HOSE

RUBBER HOSE

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.

CLEVELAND—See Mechanical Rubber Co.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

CRESCENT Belting & Packing Co., Trenton, N. J.

DIAMOND Rubber Co., Akron, O.
(See page 139.)

EMPIRE Rubber Mfg. Co., Trenton, N. J.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J.
(See page 385.)

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MATTSON Rubber Co., Lodi, N. J.
(See page 431.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O. "Cleveland."

MERCER Rubber Co., Trenton, N. J.

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 18 Cliff St., New York, N. Y.

MORGAN & Wright, Detroit, Mich.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

NEW York Rubber Co., 84 Reade St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

Complete Index to Classification appears on Pages 8 to 22.

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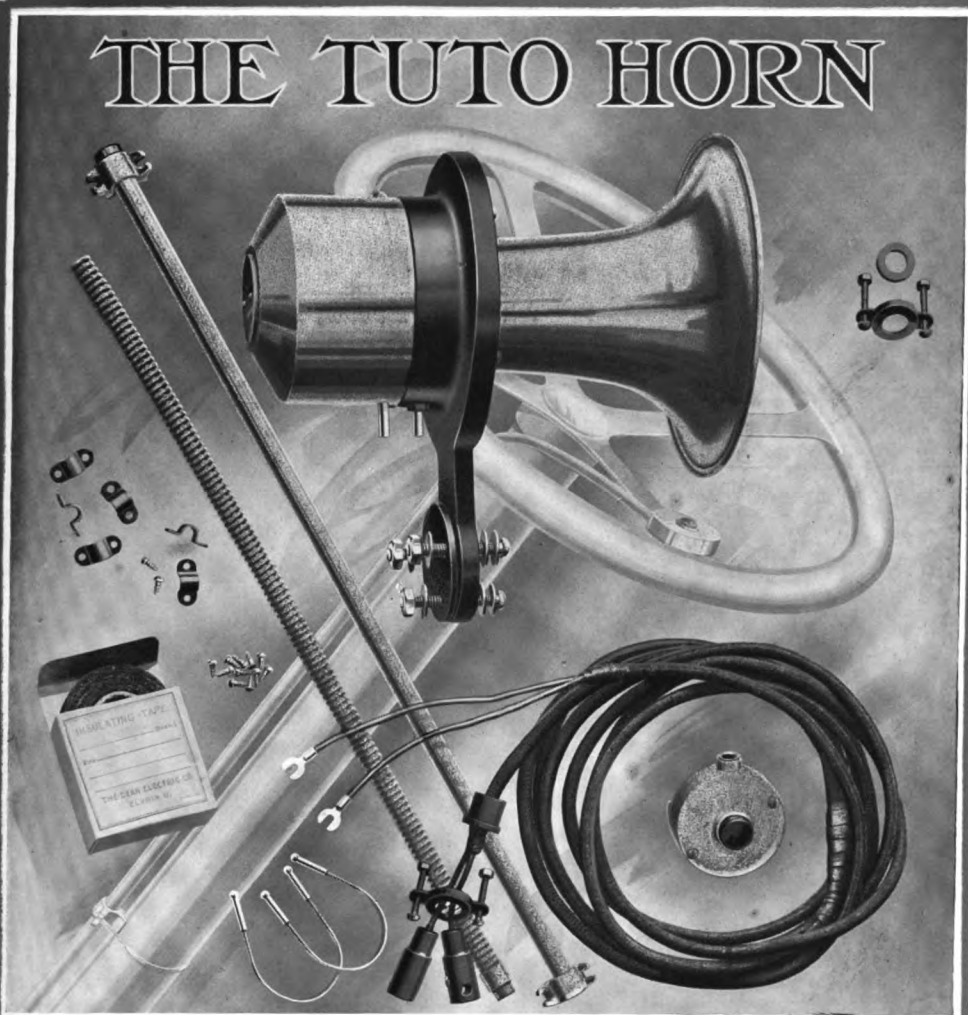
THE TUTO HORN



TWO AUTO HORNS IN ONE

It does away with all other warning, signal, or musical horns of all kinds—no mass of contraptions that make motoring a burden and render your signals of no service.

TWO POSITIVE SIGNALS—LOUD OR LOW—WITH ONE PUSH-BUTTON

Adds beauty to the car—always effective—never offensive—instant in operation—works all the time—operated wholly with the thumb of the free hand—changes from low to high pitch with the same operation—starts and stops instantly.

THE TUTO HORN

is so simple every way you can install it yourself

Shipped complete with all parts—screws, tapes, etc.

Particular motor drivers praise the "TUTO HORN" everywhere

Owners and Dealers are invited to write for our very unique and instructive booklet, "For the Motorist"—sent you FREE.

THE DEAN ELECTRIC CO., 880 TAYLOR ST., ELYRIA, OHIO

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—Your 'Phone Service

Figures very prominently in your business. Telephone service may make or mar any business. Look into it and see if your equipment is the best—Investigate our

New Dean Bullneck Telephone

which has attracted such wondrous comment and sale everywhere. Forged steel casings thruout, makes it indestructible—always in service when you need it—and could be thrown from the top of your building without breaking. It means more to you than you might think at first. Made with interchangeable parts, and an economic feature to you. Insist on your telephone company giving you only the new DEAN BULLNECK TELEPHONES.

Transmitter, Receiver, Hookswitch, Interchangeable on Wall or Desk sets—Transmitter and Mouthpiece Integral.

It's worth while to investigate them, and the

New Dean P. B. X. Switchboard

Made in unit type with capacity to suit your exact needs at all times—and to serve you the most economically.

Cabinets made of very best grade seasoned quarter-sawed oak or solid mahogany as desired. Removable back and front panels so all parts are easily accessible.

Apparatus of the very best grade and design as used on all our well-known line of multiple switchboards, insuring the very best service at all times.

Write us for full particulars as to how we can improve your TELEPHONE SERVICE.

The Dean Electric Co.
880 Taylor Street, Elyria, Ohio

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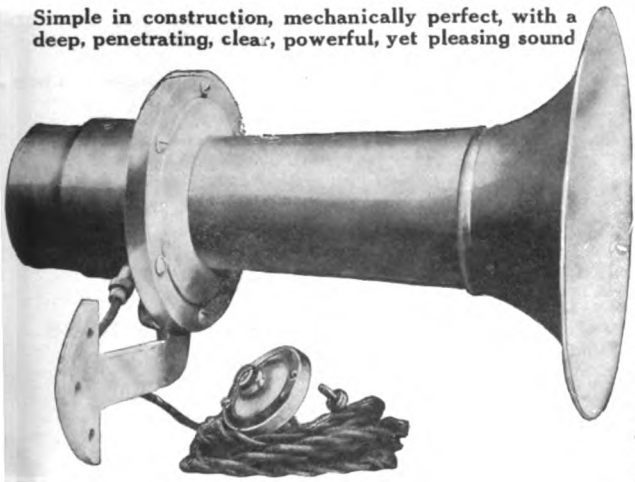
THE NEWTONE

ELECTRIC MOTOR WARNING SIGNAL

Simple in construction, mechanically perfect, with a deep, penetrating, clear, powerful, yet pleasing sound



The NEWTONE is far superior to other styles of Electric Horns owing to the fact that it eliminates all the undesirable features often experienced in other signals of its class.

Never out of order because of its simplicity of construction.

The NEWTONE consumes only one-third of the current of any other Electric Horn, yet it gives a far louder note.

Sent on approval to responsible parties, and if same does not prove to be superior to any other Motor Horns, money will be refunded.

The NEWTONE is dust and water proof, needs no screen, and is easily cleaned; is supplied with an adjustable bracket, can be attached to either side of the car, and can be had in brass, black enameled or nickel plated.

Representative Wanted—Patented April 4th—No. 988,537

AUTOMOBILE SUPPLY MFG. CO., 220-222 Taaffe Pl., Brooklyn, N. Y.

Electric Horn

Runs on Dry Cells or Storage Batteries.

A strong, penetrating, warning signal clears the way.

Made especially for Automobiles.

Retails at $15.00.

Liberal Discount to Manufacturers and Jobbers

Electric Horn & Specialty Company

UTICA, N. Y.

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HOSE (Continued)

RUBBER HOSE (Continued)

REVERE Rubber Co., 77 Bedford St., Boston, Mass.

STOKES Rubber Co., Jos., Trenton, N. J.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

WHITEHEAD Bros. Rubber Co., Trenton, N. J.

HOUSES

PORTABLE HOUSES

ALADDIN—See North American Construction Co.

AMERICAN Portable House Co., Arcade Bldg., Seattle, Wash.

BERGER Mfg. Co., Canton, O.

BURNHAM-STANDEFORD Co., Washington & First Sts., Oakland, Cal.

CHESBRO-WHITMAN Co., 1167 First Ave., New York, N. Y.

CORNELL—See Wyckoff Lumber & Mfg. Co.

CRAIG Co., David, 70 Broad St., Boston, Mass.

DUCKER Co., 277 Broadway, New York, N. Y.

ECONOMY—See Nicola Building Co.

HODGSON Co., E. F., 116 Washington St., Boston, Mass. "Wigwarm."

IDEAL Sectional Building Co., North Tonawanda, N. Y.

KARR Portable House Co., 2554 W. Irving Park Blvd., Chicago, Ill.

KENYON Co., R. L., Waukesha, Wis.

KNAPP Portable-Permanent Building Co., 123 Liberty St., New York, N. Y.

MERSHON & Morley Co., Saginaw, Mich.

METAL Shelter Co., 3-23 W. Water St., St. Paul, Minn. "Pruden."

NEW York Portable Bungalow Co., Poughkeepsie, N. Y.

NICOLA Building Co., Farmers Bank Bldg., Pittsburg, Pa. "Economy."

NILES Iron & Steel Roofing Co., Niles, O.

NORTH American Construction Co., Bay City, Mich. "Aladdin."

PORTABLE Construction Co., 50 Church St., New York, N. Y.

PRUDEN—See Metal Shelter Co.

RIVERSIDE Mfg. Co., 162-66 Riverside Ave., Newark, N. J.

RODGERS Co., J. S., Moorestown, N. J.

SPRINGFIELD Portable House Co., 412 Allen St., Springfield, Mass.

STANDARD Construction Co., 62-78 First St., Cambridge, Mass.

STEWART Building & Realty Co., F. L., 612 Liggett Bldg., St. Louis, Mo.

WIGWARM—See Hodgson, E. F.

WYCKOFF Lumber & Mfg. Co., Ithaca, N. Y. "Cornell."

HOUSINGS

PRESSED STEEL AXLE HOUSINGS

CROSBY Co., Buffalo, N. Y. (See page 227.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. (See page 243.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 227.)

SMITH Co., A. O., Milwaukee, Wis. (See page 397.)

HUBS

AEROPLANE WHEEL HUBS

ECLIPSE Machine Co., Elmira, N. Y.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

WEAVER, Jr., J. A., 956 Eighth Ave., New York, N. Y.

MOTOR CYCLE HUBS

AURORA Automatic Machinery Co., 1307 Michigan Ave., Chicago, Ill.

CORBIN Screw Corp., New Britain, Conn. (See page 243.)

ECLIPSE Machine Co., Elmira, N. Y.

NEW Departure Mfg. Co., Bristol, Conn.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

WHEEL HUBS

AMERICAN Ball-Bearing Co., L. S. & M. S. Ry. & Edgewater Park, Cleveland, O. (See page 71.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. (See page 243.)

JACKSON Drop Forging Co., Jackson, Mich.

JAMESVILLE Mfg. Co., Jamesville, N. Y.

McCUE Co., Hartford, Conn. (See pages 71 and 291.)

METAL Products Co., Waterloo St. & Detroit Terminal R. R., Detroit, Mich. (See page 745.)

MOTT Wheel Works, Utica, N. Y. (See page 699.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See pages 582 and 583.)

SMITH Co., A. O., Milwaukee, Wis. (See page 397.)

TIMKEN Detroit Axle Co., 132 Clark St., Detroit, Mich.

WESTON-MOTT Co., Flint, Mich. (See page 65.)

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"Presteel" FRAMES

ARE INTERCHANGEABLE

We have delivered One Thousand Frames to the

HUDSON MOTOR CAR CO.

for their famous "33" car, and their satisfaction with our workmanship, material and standardization is shown by the following letter:

"We are glad in reply to your recent inquiry to say that we have found the workmanship on the frames you are furnishing for the Hudson "33" to be excellent. The delivery service is entirely satisfactory and you may consider that in quality, service, materials and all other respects you have given us excellent satisfaction.

Yours very truly,
HUDSON MOTOR CAR COMPANY.
Wm. J. McAneeny,
March 9, 1911. Factory Manager."

Detroit Pressed Steel Company

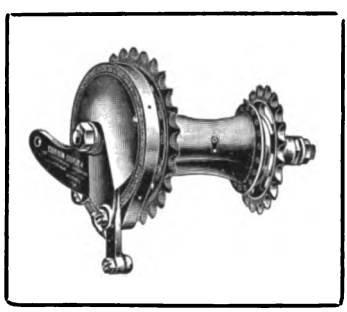
1800 Mt. Elliott Avenue, .·. .·. Detroit, Michigan

Corbin Duplex Band Brake

The Best Motorcycle Brake Ever Made

Made for either Chain or Belt Drive Motorcycles

Heavy Knockout Axle Front Hub to Match



Any Chain Line

Any size Sprocket—

⅝ or 1 inch Pitch.

Complete Catalogue on request

Licensed Coaster Brake Manufacturer

The Corbin Screw Corporation

NEW BRITAIN, CONNECTICUT

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HYDROMETERS

TESTING HYDROMETERS

(For testing Battery Electrolyte, Gasoline, etc.)

ALCO-METER—See Larchmont Mfg. Co.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

EDELMANN & Co., E., 47-49 W. Kinzie St., Chicago, Ill.

FREEZOMETER—See Taylor Instrument Cos.

HOHMANN & Maurer, Rochester, N. Y.

LARCHMONT Mfg. Co., Larchmont, N. Y. "Alco-Meter."

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y.

TAGLIABUE Mfg. Co., C. J., 396-98 Broadway, New York, N. Y.

TAYLOR Instrument Cos., Rochester, N. Y. "Freezometer."

INDICATORS

BOAT SPEED INDICATORS

NICHOLSON Ship Log Co., 409 Superior Ave., N. W., Cleveland, O.

ROPER & Co., C. F., 27 Northrop St., Hopedale, Mass.

ENGINE SPEED INDICATORS

ELECTRIC Speedometer Co., Washington, D. C. "Hopkins."
(See page 389.)

HOPKINS—See Electric Speedometer Co.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

VEEDER Mfg. Co., Hartford, Conn.

INFLATORS

TIRE INFLATORS

(See Pumps; also Tanks)

INJECTORS

BOILER FEEDING INJECTORS

PENBERTHY Injector Co., 360 Holden Ave., Detroit, Mich.

GREASE INJECTORS

(See Guns, Grease)

INSTRUMENTS

MOTOR TESTING INSTRUMENTS

(For locating knocks)

BAYLISS Co., Bloomfield, N. J. "Locophone."

GAYLOR Automatic Stropper Co., Stamford, Conn.

HOPEWELL Bros., 29 Chapel St., Newton, Mass. "Vibracator."
(See page 767.)

LOCOPHONE—See Bayliss Co.

PILLING & Son Co., G. P., Philadelphia, Pa. "Phonendoscope."

PHONENDOSCOPE—See Pilling & Son Co.

VIBRACATOR—See Hopewell Bros.

NAUTICAL INSTRUMENTS

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

HAND & Sons, John, 222 Walnut St., Philadelphia, Pa.

HUTCHINSON, Chas. C., 152 State St., Boston, Mass.

KEUFFEL & Esser Co., 127 Fulton St., New York, N. Y.

MERRILLS Sons, R., 66 South St., New York, N. Y.

NEGUS, T. S. & J. D., 140 Water St., New York, N. Y.

RIGGS & Bros., 310 Market St., Philadelphia, Pa.

STEEL TESTING INSTRUMENTS

SCLEROSCOPE—See Shore Instrument & Mfg. Co.

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y. "Scleroscope."
(See page 741.)

WIRELESS TELEGRAPH INSTRUMENTS

CLARK Wireless Telegraph-Telephone Co., 193-95 Cass Ave., Detroit, Mich.

MURDOCK Co., Wm. J., Carter St. & Everett Ave., Chelsea, Mass.

INTENSIFIERS

SPARK INTENSIFIERS

(See Gaps, Sparks)

Complete Index to Classification appears on Pages 8 to 22.

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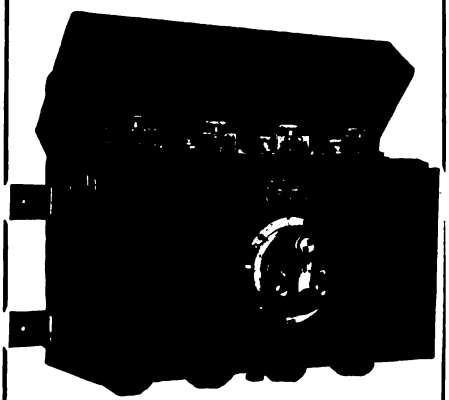
NATIONAL QUALITY



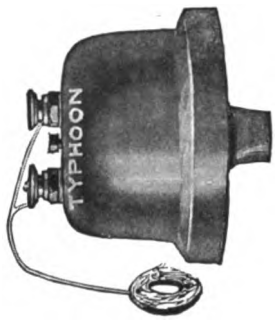
THE accompanying cut represents the highest type of marine coil encased in a beautiful mahogany box. The coil is strictly waterproofed with a specially prepared compound and is adapted for the highest grade of automobile engines. The heat resisting qualities of the insulation have no equal. This is simply one of the many types we manufacture. All of the standard "National Quality" look for others to follow.

Our complete catalogue contains much valuable information. Ask for it.

National Coil Co.

LANSING, MICHIGAN

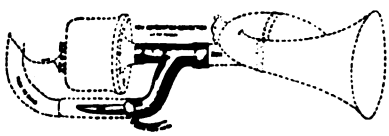
The TYPHOON ELECTRIC HORN



TYPE "A"

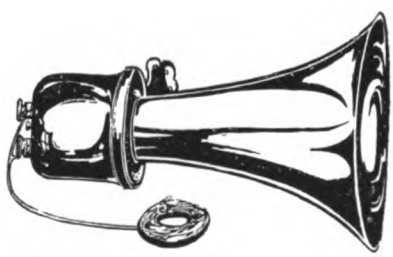
$8

TYPE "A" is made to be screwed to any regular twisted horn on a car, thereby magnifying the sound of the ordinary bulb tenfold



COMBINATION CONNECTION $1.00

This Combination Connection and TYPE "A" will enable the use of either loud electric horn or regular tubular bulb



TYPE "B"
Complete, "most practical signal produced"

$10

"As loud as is necessary"
Guaranteed one year

TYPHOON SIGNAL CO.
1389 Milwaukee Avenue, Chicago, Ill.

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IRONS

BODY OR TOP IRONS

ANDERSON Forge & Machine Co., 18 St. Aubin Ave., Detroit, Mich.
(See page 541.)

ASHTABULA Bow Socket Co., Ashtabula, O.
(See page 689.)

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 355.)

NEWTON & Son, W. H., 125 Elm St., Cortland, N. Y.

SCHERER & Co., H., Detroit, Mich.

SLAT IRONS

(See also Sockets, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

COWLES & Co., C., New Haven, Conn.
(See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DRUEN, B. D., 71 Hamilton St., New Haven, Conn.

NON-CORROSIVE Metal Co., Watertown, Mass.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

TIRE IRONS

(See Tools, Tire)

JACKS

LIFTING JACKS

A. B. C. Jack Co., 14 Columbus Ave., Boston, Mass.

ALRITE—See National Jack & Mfg. Co.

ASHLAND Mfg. Co., 131 Main St., Ashland, O. "Crown."
(See page 247.)

ASHMORE & Bennett, 1900-02 E. 15th St., Kansas City, Mo.

BARRETT—See Duff Mfg. Co.

BARTH Mfg. Co., 74 L St., Milwaukee, Wis.
(See page 247.)

BATAVIA Clamp Co., 131 Center St., Batavia, N. Y. "Colts."
(See page 213.)

BERGER Co., Joseph, 310-20 Hart St., Dayton, O.

BOTTOMLEY Machine Co., Alliance, O. "Reliable."

BUCKEYE Jack Mfg. Co., Alliance, O.
(See page 247.)

BUDA Co., Railway Exchange Bldg., Chicago, Ill.

CHICAGO Jack & Supply Co., 159 La Salle St., Chicago, Ill.

COOK'S Standard Tool Co., Kalamazoo, Mich. "Standard."

COLTS—See Batavia Clamp Co.

COVERT Mfg. Co., Troy, N. Y.

CROWN—See Ashland Mfg. Co.

DUFF Mfg. Co., Pittsburg, Pa. "Barrett."

ELITE Mfg. Co., Ashland, O. "Reliable."

EMPIRE Jack Co., 11-15 Dill St., Auburn, N. Y.

EUREKA Mower Co., Hickory & Schuyler Sts., Utica, N. Y.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis.
(See page 283.)

GIANT—See S. B. R. Specialty Co.

HARTFORD Suspension Co., 149 Bay St., Jersey City, N. J.
(See pages 379 and 380.)

JOYCE-CRIDLAND Co., Dayton, O. "XX Century."

KENNEY Mfg. Co., New London, Conn.

KLEMM, E. R., 616 Monroe St., Chicago, Ill.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Raiswell"
(See page 757.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NATIONAL Jack & Mfg. Co., 130-32 S. Clinton St., Chicago, Ill. "Airite."

NEW SAMPSON—See Oliver Mfg. Co.

OLIVER Mfg. Co., 326 S. Desplaines St., Chicago, Ill. "Peerless," "New Sampson."

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

ORANGE Machine & Mfg. Co., 18-20 Stetson St., Orange, N. J.

PEERLESS—See Oliver Mfg. Co.

PRATT Mfg. Co., Wm. E., 91 Lake St., Chicago, Ill.

RAISWELL—See Lovell-McConnell Mfg. Co.

RELIABLE—See Bottomley Machine Co.

RELIABLE—See Elite Mfg. Co.

S. B. R. Specialty Co., E. Orange, N. J. "Giant."
(See page 451.)

SHAWVER Co., Springfield, O. "Springfield."

SMITH & Heminway, 108-10 Duane St., New York, N. Y.

SPITZLI Mfg. Co., 6-12 Devereaux St., Utica, N. Y.

SPRINGFIELD—See Shawver Co.

STANDARD—See Cook's Standard Tool Co.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

VAN—See Vanderpool Bros.

VAN Buren Tool Co., Van Buren, Ind.

VANDERPOOL BROS., 723 W. Mulberry St., Springfield, O. "Van."

XX CENTURY—See Joyce-Cridland Co.

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Building Jacks has been our business for 18 years. We make them from one to ten ton.

BARTH MFG. CO.
74 L Street,
MILWAUKEE,
WIS.

Buckeye Jacks In All Sizes

Suitable for any size and style Automobiles made. For cars weighing from 500 to 8000 pounds. The largest variety of sizes made by any Jack Manufacturing Company in America.

Style	Capacity	Height Bar Down	Raise of Bar	Height Bar Raised	Weight Pounds	Size of Base
No. 0	1 Ton	12″	6″	18″	9	3¾x5¾″
05	1 Ton	12″	6″	18″	9	3¾x5¾″
02	1 Ton	12″	6″	18″	8¾	3 x5¾″
01	1 Ton	8¾″	5″	13¾″	8¼	3 x5¾″
01	1 Ton	9¼″	5″	14¼″	8½	3¾x5¾″
03	1800 lb.	10″	6″	16″	5	2⅞x4½″
04	1 Ton	10½″	7½″	18″	7½	3 x5⅞″

THE BUCKEYE JACK MFG. CO.
ALLIANCE, OHIO.

MYERS'

"AERTITE" Tire Pump

will pump more air in less time, with less effort, to higher pressure than any other hand pump.
The only pump that has

Metal Piston
with
Metal Expansion Rings

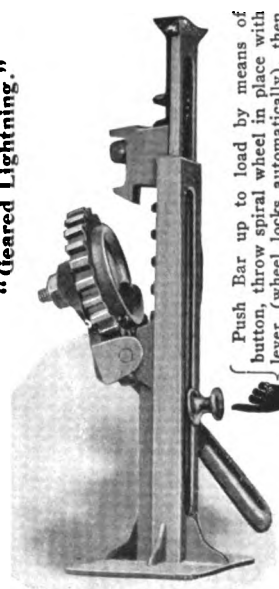
just like an engine cylinder and is sold with a guarantee. It sells wherever shown and stays sold.

List Price, $10.00

Get our dealers proposition.

Keystone Novelty Co.
COLUMBIA, PA.

This cut shows the QUICK Adjustment feature. Almost as quick as "Geared Lightning."



Push Bar up to load by means of button, throw spiral wheel in place with lever (wheel locks automatically), then work lever and your load IS UP.
TIME: 15 seconds up and 10 down.

Let us quote you price and send description of our 1910 Crown Jacks.

THE ASHLAND MFG. CO.
131 Main Street ASHLAND, OHIO

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JACKS (Continued)

SUPPORTING JACKS

(For holding car off the floor when not in use)

BECKERT, William, 1005 E. Ohio St., Allegheny, Pa.

BICYCLE Step Ladder Co., 65 Randolph St., Chicago, Ill.

BIG FOUR—See Travis Co.

ELITE Mfg. Co., Ashland, O.

FOUR-WHEEL Auto Jack Mfg. Co., Reading, Pa.

GARLICK Auto Prop. Co., 250 12th Ave., Paterson, N. J.

HASLUP Motor Jack Co., Sidney, O.

MILWAUKEE Auto Specialty Co., 152 2d St., Milwaukee, Wis. "Radium." (See page 613.)

MOORE & Co., J. C., Racine, Wis.

OLIVER Mfg. Co., 326 S. Desplaines St., Chicago, Ill.

OMEGA Separator Co., Lansing, Mich. (See page 605.)

PRATT Mfg. Co., Wm. E., 91 Lake St., Chicago, Ill.

RADIUM—See Milwaukee Auto Specialty Co.

READING Automobile Co., 126-28 5th St., Reading, Pa.

SCHREIBER, W. F., Cedar Rapids, Ia.

SHAWVER Co., Springfield, O. "Springfield."

SPRINGFIELD—See Shawver Co

TRAVIS Co., G. E., Henry, Ill. "Big Four."

JARS

RUBBER BATTERY JARS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

DIAMOND Rubber Co., Akron, O. (See page 139.)

MORGAN & Wright, Detroit, Mich.

STOKES Rubber Co., Jos., Trenton, N. J.

VULCANIZED Rubber Co., 488 Broadway, New York, N. Y.

JOBBERS

SUPPLY JOBBERS

(This is a list of Jobbers and Dealers in Automobile Supplies who advertise in this publication)

AUTOMOBILE Supply Co., 1335 Michigan Ave., Chicago, Ill. (See page 637.)

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. (See page 159.)

M. & M. Co., 414 Prospect Ave., Cleveland, O. (See page 749.)

NAGEL Electric Co., W. G., Toledo, O. (See page 421.)

POST & Lester Co., 175 Asylum St., Hartford, Conn. (See page 637.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y. (See page 759.)

SHAIN, Chas. D., 1926 Broadway, New York, N. Y. (See page 589.)

WASHINGTON Automobile Supply Co., Washington, Ill. (See page 631.)

JOINTS

BALL JOINTS

(For spark and throttle connections)

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BIRCHWOOD, C. W., 3614 W. Harrison St., Chicago, Ill.

MECHANICAL & Electrical Mfg. Co., A R 2227 Prairie Ave., Chicago, Ill. "Memco." (See page 249.)

MEMCO—See Mechanical & Electrical Mfg. Co.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

UNIVERSAL JOINTS

ACME Universal Joint Mfg. Co., Kalamazoo, Mich.

AUTO Parts Mfg. Co., Muncie, Ind. "B.T.K."

B.T.K.—See Auto Parts Mfg. Co.

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass. (See page 497.)

BLOOD Bros. Machine Co., Ransom St. & S. Haven R. R., Kalamazoo, Mich.

BOSTON Gear Works, Norfolk Downs, Mass. (See page 205.)

CINCINNATI Ball Crank Co., Cincinnati, O. (See page 543.)

COATES Clipper Mfg. Co., 237 Chandler St. Worcester, Mass.

COOK'S Standard Tool Co., Kalamazoo, Mich

DIEBOLD-PETERS Co., Whitney Power Bldg., Cleveland, O.

ERIE Auto Parts Co., 719 St. Clair Ave., N. E., Cleveland, O. "Fetzer." (See page 647.)

FETZER—See Erie Auto Parts Co.

GEARLESS Steering Device Co., Odd Fellows Bldg., Indianapolis Ind.

HARTFORD Auto Parts Co., 83 Hayshope Ave., Hartford, Conn. (See page 251.)

HUPP-TURNER Co., Lycaste St. & R. R., Detroit, Mich.

JOHNSON Service Co., Milwaukee, Wis.

K-B—See Kinsler-Bennett Co.

KINSLER-BENNETT Co., Hartford, Conn. "K-B." (See page 741.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

Complete Index to Classification appears on Pages 8 to 22.

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JOINTS (Continued)

UNIVERSAL JOINTS (Continued)

LEHMAN, I., 2187 E. Second St., Cleveland, O.

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y. "Walters."

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

MUTUAL Machine Co., Hartford, Conn. "Warrens."

SPADE Bros., Vicksburg, Mich.

SPICER Mfg. Co., Plainfield, N. J.
(See page 251.)

VACO—See Victor Appliance Co.

VANDERBEEK Tool Works, Laurel Ave., Hartford, Conn.

VICTOR Appliance Co., Watervliet, N. Y. "Vaco."

WALTERS—See Mechanical Devices Co.

WARRENS—See Mutual Machine Co.

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y.

WILSON, J. C., Portland, Conn.

KEYS

ACETYLENE GAS TANK KEYS

EDELMANN & Co., E., 47-49 W. Kinzie St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

PREST-O-LITE Co., 1400 E. South St., Indianapolis, Ind.
(See pages 157 and 417.)

STERLING Machine & Stamping Co., Wellington, O.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

KITS

TIRE REPAIR KITS

(See also Cement, Tire; also Patches, Tire; also Plugs, Tire; also Sleeves, Tire)

AKRON—See Empire Mfg. Co.

AUTO Time Saver Repair Kit Co., 178 Devonshire St., Boston, Mass.

BEATSEMALL—See Rock Island Specialty Mfg. Co.

EMPIRE Mfg. Co., Akron, O. "Akron."

GOODRICH Co., B. F., Akron, O.

GOOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HAZEN-BROWN Co., 101 South St., Boston, Mass.

M. & M. Mfg. Co., Akron, O.

MICHELIN Tire Co., Milltown, N. J.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

ROCK Island Specialty Mfg. Co., 114 W. 17th St., Rock Island, Ill. "Beatsemal."

STAR Rubber Co., 405 Sweitzer Ave., Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

KNUCKLES

STEERING KNUCKLES

(See Axles: also Forgings)

LABORATORIES

TESTING LABORATORIES

DETROIT Testing Laboratory, 1111 Union Trust Bldg., Detroit, Mich.
(See page 665.)

LACE

COACH LACE, WEBBING AND CORD

BRIDGEPORT Coach Lace Co., 806 Wood Ave., Bridgeport, Conn.

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."
(See page 439.)

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

LAMPS

ACETYLENE MOTOR CYCLE LAMPS

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 259.)

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

BRECKENRIDGE—See Seiss Mfg. Co.

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn.
(See page 337.)

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn. "Old Sol."
(See page 673.)

HINE-Watt Mfg. Co., 45-49 Randolph St., Chicago, Ill.

NEVEROUT—See Rose Mfg. Co.

OLD SOL—See Hawthorne Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia Pa. "Neverout."

SEISS Mfg. Co., 433-35 Dorr St., Toledo, O. "Breckenridge."

SOLAR—See Badger Brass Mfg. Co.

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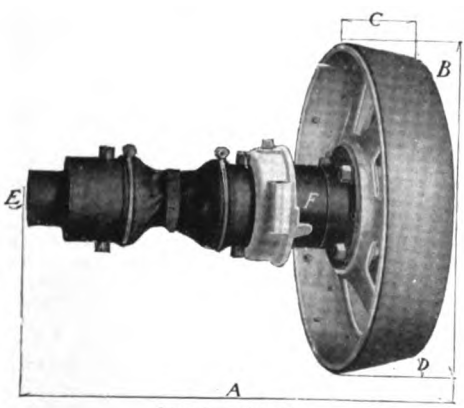

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Double Universal Joints included with Clutch. Adjustable springs under leather facing.

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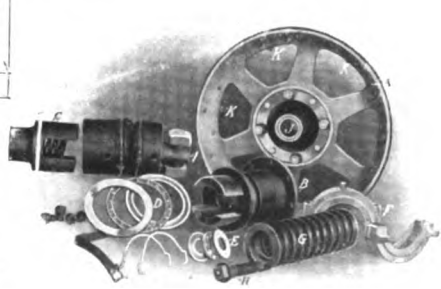
Thrust bearing; thoroughly protected and housed—for throw-out. Eliminates squeaking rollers and other such make-shift devices.



Clutch Dis-assembled.

The Hartford Auto Parts Co.

83 Huyshope Avenue, Hartford, Conn.

J. S. BRETZ CO., Selling Agents, New York.

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LAMPS (Continued)

ANCHOR AND SIDE LAMPS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

MORRISON, Frank, 1410 W. 11th St., Cleveland, O.

PERSKY & Co., F., 52 Elizabeth St., New York, N. Y.

PORTER Co., 194 Water St., New York, N. Y.

RUSSELL & Stoll Co., New York, N. Y.

RUSSELL & Watson, Buffalo, N. Y.

WEBB & Sons Co., Elisha, 136 S. Front St., Philadelphia, Pa.

BINNACLE LAMPS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

MARINE Compass Co., Bryantville, Mass. "Perfect."

MORRISON, Frank, 1410 W. 11th St., Cleveland, O.

PERFECT—See Marine Compass Co.

PERSKY & Co., F., 52 Elizabeth St., New York, N. Y.

SHERMAN, Eugene M., Reed St., Lexington, Mass.

CABIN LAMPS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

HADLOCK & Co., W. E., 132 State St., Boston, Mass.

MILLER & Co., Edward, Meriden, Conn.

MORRISON, Frank, 1410 W. 11th St., Cleveland, O.

PERSKY & Co., F., 52 Elizabeth St., New York, N. Y.

PORTER Co., 194 Water St., New York, N. Y.

RUSSELL & Stoll Co., New York, N. Y.

WEBB & Sons Co., Elisha, 136 S. Front St., Philadelphia, Pa.

ELECTRIC DASH OR GAUGE LAMPS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 639.)

C-S—See Culver-Stearns Mfg. Co.

COWLES & Co., C., New Haven, Conn.
(See page 351.)

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass. "C-S."

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 257.)

EVER READY—See American Ever Ready Co.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill.
(See page 255.)

GUIDE Motor Lamp Mfg. Co., Cleveland, O.
(See page 61.)

HOLT & Beebee, 40 Sudbury St., Boston, Mass.
(See page 257.)

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

S-H—See Stuart-Howland Co.

STUART-HOWLAND Co., 1-3 Winthrop Sq., Boston, Mass. "S-H."

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

ELECTRIC HAND OR INSPECTION LAMPS

(Lamp and flexible cord for attachment to ignition battery)

AMERICAN Enamel Co., Providence, R. I. "Britelite."

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

AMPVO Battery Co., 16th St. & Michigan Ave., Chicago, Ill.
(See page 79.)

BRITELITE—See American Enamel Co.

C-S—See Culver-Stearns Mfg. Co.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn.
(See page 369.)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass. "C-S."

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 257.)

EVER READY—See American Ever Ready Co.

FENNER Co., W. A., Providence, R. I.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago Ill.
(See page 255.)

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y.
(See page 653.)

GUIDE Motor Lamp Mfg. Co., Cleveland, O.
(See page 61.)

HARVARD Electric Co., 525 Van Buren St., Chicago, Ill.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

METAL Specialties Mfg. Co., 427-41 Randolph St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

PRESTO—See Metal Specialties Mfg. Co.

REFLECTORSCOPE Mfg. Co., White Plains Ave. & 241st St., New York, N. Y.
(See page 253.)

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A High Quality Low Priced Necessity

NOT A LOW QUALITY HIGH PRICED LUXURY

Prevents Explosions
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It gives a beautiful bright light **just where you need it.**

It is the only combination light and reflector in existence that will show **the back of the object.**

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"ROYAL" STEEL LAMPS for commercial vehicles. Warranted to stand any vibration.

"Royal," per pair . .	$15.00
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"Royal" Tail Lamp .	3.50

The Dietz Line of standard round and square side lamps is continued for 1911 with improvements. Dietz "Dainty"—the most reliable tail lamp made.

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LAMPS (Continued)

ELECTRIC HAND OR INSPECTION LAMPS (Continued)

S.-H.—See Stuart-Howland Co.

SHAIN, Chas. D., 1926 Broadway, New York, N. Y.
(See page 589.)

STUART-HOWLAND Co., 1-3 Winthrop Sq., Boston, Mass. "S-H."

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."
(See page 163.)

ELECTRIC SIDE AND TAIL LAMPS

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake."

ADLAKE—See Adams & Westlake Co.

AMERICAN Luxfer Prism Co., 42 Madison St., Chicago, Ill.

AUTOMATIC Appliance Co., 162-72 Columbus Ave., Boston, Mass. (Tail lamps only.)

AVERY Portable Lighting Co., Milwaukee, Wis. "Electrobola."

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 259.)

BADGER Brass Mfg. Co., Kenosha, Wis.

BUFFALO Lamp Co., 191 Clinton St., Buffalo, N. Y.

CASTLE Lamp Co., Amesbury, Mass.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBUS Auto Brass Co., Columbus, O.
(See page 255.)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Excelsior," "Sentinel."
(See page 253.)

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 257.)

ELECTROBOLA—See Avery Portable Lighting Co.

EMPIRE—See Indiana Lamp Co.

ENGLISH & Mersick Lamp & Foundry Co., New Haven, Conn.

EXCELSIOR—See Dietz Co.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago Ill.
(See page 255.)

FOY—See Randall-Faichney Co.

GORDON Co., Thomas S., 557-61 Jackson Blvd., Chicago, Ill. (Tail lamps only.)

GRAY & Davis, Amesbury, Mass.
(See page 255.)

GUIDE Motor Lamp Mfg. Co., Cleveland, O.
(See page 61.)

H. & H.—See Hammer & Hull.

HALL LAMP CO., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER & Hull, 1839 Euclid Ave., Cleveland, O. "H. & H."

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.
(See page 257.)

HOLT & Beebee, 40 Sudbury St., Boston, Mass.
(See page 257.)

INDIANA Lamp Co., Connersville, Ind., "Empire."

KINLEY Mfg. Co., Hoyne Ave., Van Buren St., Chicago, Ill.

KNICKERBOCKER Brass Goods Co., 124th St. & First Ave., New York, N. Y.

PARKER Co., John L., 62 Jackson St., Worcester, Mass. (Tail lamps only.)

RANDALL-FAICHNEY Co., 251 Causeway St., Boston, Mass. "Foy." (Tail lamps only.)
(See pages 171 and 669.)

SAXON Lamp Co., 526-32 W. 28th St., New York, N. Y.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SENTINEL—See Dietz Co.

SPRAGUE-WALDO Mfg. Co., 19-23 Harper Ave., Detroit, Mich.
(See page 255.)

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

MINIATURE TUNGSTEN LAMPS

BANNER Electric Co., Youngstown, O.

BRILLIANT Electric Co., 401 Electric Bldg., Cleveland, O.

BRYAN-MARSH Co., 315 Dearborn St., Chicago, Ill.

BUCKEYE Electric Co., 321 Cuyahoga Bldg., Cleveland, O.

COLONIAL Electric Co., Warren, O.

COLUMBIA Incandescent Lamp Co., 2115 Locust St., St. Louis, Mo.

ECONOMICAL Electric Lamp Co., 25 W. Broadway, New York, N. Y.

FEDERAL Miniature Lamp Co., 1806 E. 45th St., Cleveland, O.

FOSTORIA Incandescent Lamp Co., Fostoria, O.

GENERAL Electric Co., Schenectady, N. Y. "Mazda."

GENERAL Incandescent Lamp Co., 225 Electric Bldg., Cleveland, O.

HOWARD Miniature Lamp Co., 327 Academy St., Newark, N. J.

MAZDA—See General Electric Co.

MONARCH Incandescent Lamp Co., 481 Wabash Ave., Chicago, Ill.

MUNDER Electric Co., Springfield, Mass.

NEW York & Ohio Co., Warren, O. "Packard."

PACKARD—See New York & Ohio Co.

SHELBY Electric Co., Shelby, O.

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LAMPS (Continued)

MINIATURE TUNGSTEN LAMPS (Continued)

STANDARD Electrical Mfg. Co., Warren, O.

STERLING Electrical Mfg. Co., Warren, O.

SUNBEAM Incandescent Lamp Co., 500 S. Clinton St., Chicago, Ill.

U. S. INCANDESCENT Lamp Co., 423 Laclede Bldg., St. Louis, Mo.

WARREN Electric & Specialty Co., Warren, O.

ACETYLENE GAS LAMPS

AMERICAN Lamp Works, 253 W. 47th St., New York, N. Y. "Liberty."

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y. (See page 259.)

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O. (See page 259.)

CASTLE Lamp Co., Amesbury, Mass.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill. "Diamond."

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIAMOND—See Chicago Auto Lamp Works.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Majestic." "Victor." (See page 253.)

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J". (See page 257.)

EMPIRE—See Indiana Lamp Co.

ENGLISH & Mersick Lamp & Foundry Co., New Haven, Conn.

GRAY & Davis, Amesbury, Mass. (See page 255.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HINE-WATT Mfg. Co., 45-49 Randolph St., Chicago, Ill. "Columbia."

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y. (See page 257.)

INDIANA Lamp Co., Connersville, Ind. "Empire."

KNICKERBOCKER Brass Goods Co., 124th St. & First Ave., New York, N. Y.

LIBERTY—See American Lamp Works.

MAJESTIC—See Dietz Co.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

O'NEILL Lighting Co., Detroit, Mich.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 749.)

SAXON Lamp Co., 526-32 W. 28th St., New York, N. Y.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SOLAR—See Badger Brass Mfg. Co.

20TH Century Mfg. Co., 420-22 Ogden St., Newark, N. J.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR—See Dietz Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

ALCOHOL LAMPS

ETHYLIGHT Co., Marbridge Bldg., New York, N. Y. (See page 259.)

OIL LAMPS

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake."

ADLAKE—See Adams & Westlake Co.

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O. "Perfection." (See page 259.)

CASTLE Lamp Co., Amesbury, Mass. "Staylit."

COLD BLAST—See Ham Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

COWLES & Co., C., New Haven, Conn. (See page 351.)

DAINTY—See Dietz Co.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Sterling." "King" "Queen." "Regal." "Ideal." "Orient." "Dainty." "Royal." (See page 253.)

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J". (See page 257.)

EMPIRE—See Indiana Lamp Co.

ENGLISH & Mersick Lamp & Foundry Co., New Haven, Conn.

GRAY & Davis, Amesbury, Mass. (See page 255.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAM Mfg. Co., C. T., 731 Oak St., Rochester, N. Y. "Cold Blast."

HOFACKER Mfg. Co , 553-55 W. 42d St., New York, N. Y. (See page 257.)

IDEAL—See Dietz Co.

INDIANA Lamp Co., Connersville, Ind. "Empire."

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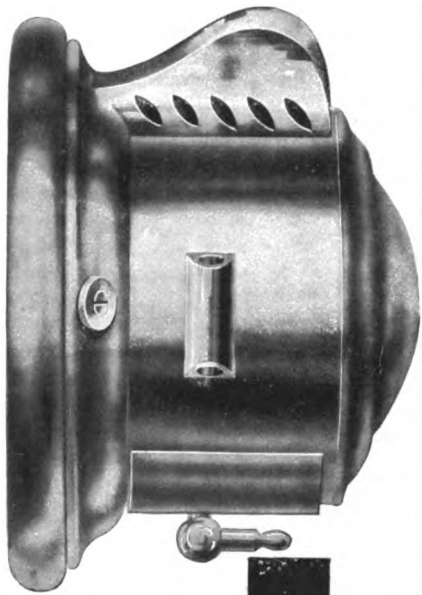

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LAMPS (Continued)

OIL LAMPS (Continued)

KING—See Dietz Co.

KNICKERBOCKER Brass Goods Co., 124th St. & First Ave., New York, N. Y.

LOCKWOOD Co., 34 Mechanic St., Newark, N. J.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

ORIENT—See Dietz Co.

PERFECTION—See Brown Mfg. Co.

QUEEN—See Dietz Co.

REGAL—See Dietz Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

ROYAL—See Dietz Co.

SCOVILLE & Peck Co., 15 Wooster St., New Haven, Conn.

SOLAR—See Badger Brass Mfg. Co.

STAYLIT—See Castle Lamp Co.

STERLING—See Dietz Co.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., 1249 Plum St., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

OIL MOTOR CYCLE LAMPS

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

DERBY—See Ham Mfg. Co.

HAM Mfg. Co., C. T., 731 Oak St., Rochester, N. Y. "Derby."

HINE-WATT Mfg. Co., 45-49 Randolph St., Chicago, Ill.

NEVEROUT—See Rose Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

SOLAR—See Badger Brass Mfg. Co.

COLWELL Lead Co., 109 Lafayette St., New York, N. Y.

HOYT Metal Co., Merchants-LaClede Bldg., St. Louis, Mo.

NATIONAL Lead Co., 111 Broadway, New York, N. Y.
(See page 551.)

NATIONAL Lead & Oil Co. of Pa., Pittsburg, Pa.

NORTH American Smelting Co., Ninth & Thompson Sts., Philadelphia, Pa.

SANDOVAL Zinc Co., 410 N. Peoria St., Chicago, Ill.

SELBY Smelting & Lead Co., Merchants Exchange Bldg., San Francisco, Cal.

TATHAM & Bro., 226 S. Fifth St., Philadelphia, Pa.

WHITE AND RED LEAD

BOSTON STAR — See Chadwick-Boston Lead Co.

CHADWICK-BOSTON Lead Co., 162 Congress St., Boston, Mass. "Forest River," "Boston Star."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

DETROIT White Lead Works, 530-60 Milwaukee Ave. E., Detroit, Mich.

EAGLE White Lead Co., Cincinnati, O.

FOREST RIVER — See Chadwick-Boston Lead Co.

HAMMAR Bros. White Lead Co., E. St. Louis, Ill.

HARRISON Bros. & Co., 35th St. & Grays Ferry Rd., Philadelphia, Pa.

HAZARD Lead Works, Hazardville, Conn.

NATIONAL Lead Co., 111 Broadway, New York, N. Y.
(See page 551.)

NATIONAL Lead & Oil Co. of Pa., Pittsburg, Pa.

NEVIN Co., T. H. (North Side), Pittsburg, Pa.

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y.

TOCH Bros., 320 Fifth Ave., New York, N. Y.

WETHERILL & Bro., 126 S. 30th St., Philadelphia, Pa.

LAVA

AMERICAN Lava Co., Chattanooga, Tenn.
(See pages 109 and 110.)

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

LEAD

SHEET LEAD

BOGUE Lead Co., 1809-15 Blake St., Denver, Col.

CHADWICK-BOSTON Lead Co., 162 Congress St., Boston, Mass.

LEADS

SOUNDING LEADS

MARINE Hardware & Equipment Co. (S. Portland), Portland, Me.

LEATHER

ARTIFICIAL OR IMITATION LEATHER

BOSTON Artificial Leather Co., 310 Fourth Ave., New York, N. Y. "Moroccoline."

CARR Co., F. S., Boston, Mass.
(See page 177.)

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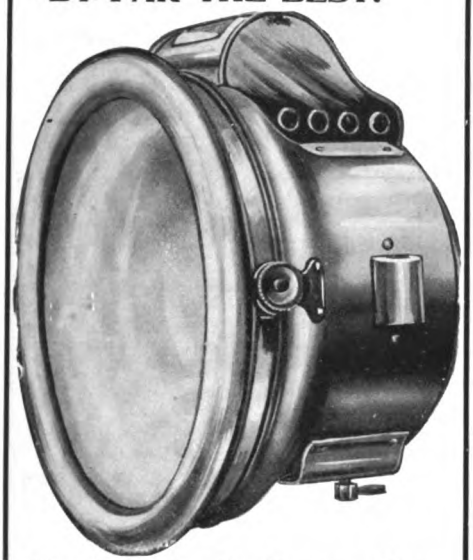

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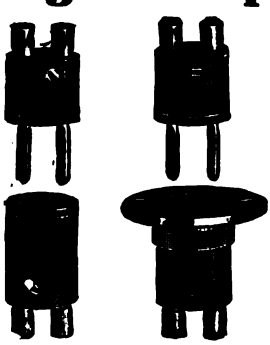
516 Atlantic Ave., Boston, Mass.



Style B Style D

ETHYLIGHT An Automobile Headlight
(BURNING DENATURED ALCOHOL)
WITHOUT TANK WITHOUT TUBES
ONE CENT ONE HOUR
WRITE FOR DESCRIPTIVE CATALOGUE AND FULL INFORMATION
ETHYLIGHT COMPANY
MARBRIDGE BUILDING HERALD SQUARE
NEW YORK

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LEATHER (Continued)

ARTIFICIAL OR IMITATION LEATHER (Continued)

CHANDLER Oil Cloth & Buckram Co., E. Taunton, Mass.

CHASE & Co., L. C., Boston, Mass. (Dealers.)
(See page 149.)

COOKS Linoleum Co., Trenton, N. J.

FABRIKOID Works, Newburgh, N. Y.
(See page 263.)

KERATOL Co., South & Van Buren Sts., Newark, N. J.

MAROKENE Co., 6 Fletcher St., New York, N. Y.

MOROCCOLINE—See Boston Artificial Leather Co.

MUTTY Co., L. J., Boston, Mass.
(See page 105.)

O'BANNON Corp., 72 Duane St., New York, N. Y.
(See page 263.)

PANTASOTE Co., 11 Broadway, New York, N. Y.

FRICTION LEATHER

(For lining brakes and clutches—See also Banding Brake; also Belting, Leather; also Fibre, Hard)

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.

APEX Belting Co., 41-43 S. Third St., Philadelphia, Pa.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DUCKWALL Belting & Hose Co., 123 W. Maryland St., Indianapolis, Ind.

GRATON & Knight Mfg. Co., Worcester, Mass.
(See page 385.)

HUDSON Belting Co., 1-3 Eaton Pl., Worcester, Mass.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

M.L.B.—See Milwaukee Leather Belting Co.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

MILWAUKEE Leather Belting Co., Milwaukee, Wis. "M. L. B."
(See page 261.)

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

PROVIDENCE Belting Co., 25 Charles St., Providence, R. I.

RAHMANN & Co., Geo., 6 Ferry St., New York, N. Y.

SCHIEREN Co., Chas. A., New York, N. Y.
(See page 261.)

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

WILLIAMS & Sons, I. B., Dover, N. H.

NATURAL LEATHER

AMERICAN Leather Mfg. Co., Newark, N. J.

AMERICAN Oak Leather Co., Cincinnati, O.

ASHTABULA Hide & Leather Co., Ashtabula, Ohio.

ATLANTIC Leather Co., 173 Wright St., Newark, N. J.

BADGER State Tanning Co., Sheboygan, Wis.

BEAVER—See Straus & Sons, M.

BERNSTEIN Bros., 216 Frelinghuysen Ave., Newark, N. J.

BLANCHARD Bro. & Lane, 20 Bruen St., Newark, N. J.

BRIDGEPORT Patent Leather Mfg. Co., Bridgeport, Conn.

BYRON & Sons, W. D., Williamsport, Md. "Tanok."

CAFFREY Leather Co., M., 474-88 Frelinghuysen Ave., Newark, N. J.

CARTER Co., Geo. R., 1600-20 Kentucky Ave., Connersville, Ind. (Dealers.)
(See page 687.)

CLEVELAND Tanning Co., Jennings & Dennison Aves., S. W., Cleveland, O.

DIEFENTHALER, J. V., 90 Hamilton St., Newark, N. J.

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importers.) (Chrome leather for tires only.)

ELDRED Leather Co., Eldred, Pa.

FIVE BROTHERS—See Klauder Co.

HERTZ Co., Max., 63 Oliver St., Newark, N. J.

HOWELL Co., T. P., New & Nuttman Sts., Newark, N. J. "Lion."

HOWELL - HINCHMAN Co., Middletown, N. Y.

KLAUDER Co., Charles L., Allegheny Ave. & B St., Philadelphia, Pa. "Five Brothers."

LACKAWANNA Leather Co., Hackettstown, N. J.

LION—See Howell Co.

LOUNSBERY & Sons, G. H., Cincinnati, O. (Dealers.)
(See page 555.)

McCORMICK & Sons, E. H., Ave. C & Vanderpool St., Newark, N. J.

RADEL Leather Mfg. Co., Hamburg Place Road, Newark, N. J.

RASER Tanning Co., Ashtabula, O.

REILLY, John, Ave. C. & Murray St., Newark, N. J.

REILLY & Son Corp., P., Matt St. & Passaic Ave., Newark, N. J.

REX Imperial Leather Co., 12-28 Chapel St., Newark, N. J.
(See page 261.)

SHIELDS Bros., Bombay, N. Y.

SMITH Co., Hugh, 210 Central Ave., Newark, N. J.

SMITH & Sons, L. M., 59 Lock St., Newark, N. J.

STANDARD Leather Co. of Pittsburg, 296 Spring Garden Ave., Allegheny, Pa.

STENGEL, Geo., Frelinghuysen & Elizabeth Aves., Newark, N. J.

STENGEL & Rothschild, Kossuth & Berlin Sts., Newark, N. J.

STRAUS & Sons, M., 440 Frelinghuysen Ave., Newark, N. J. "Beaver."

TANOK—See Byron & Sons.

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A Man's Natural Expression should Be Pleasant and Dignified: BUT—

let a badly working clutch jerk a few nerves loose, and his face takes on an expression that looks like a bad dream.

SCHIEREN'S CLUTCH LEATHER

is so accurately shaved and so even in thickness that there is never any uncertainty about it taking hold just right.

SCHIEREN'S CLUTCH LEATHER is tanned especially for use in clutches, and will give perfect service, and will not BURN OUT HARD and lose its gripping quality.

This leather has been thoroughly tested and adopted by some of the best known automobile manufacturers.

Send for directions for measuring pattern cutting and applying this best of clutch facings.

Chas. A. Schieren Company
ESTABLISHED 1850

Tanners Belt M'f'rs
Output 100,000 Hides Per Year
NEW YORK

DENVER, 1752 Arapahoe st
BOSTON, 641-43 Atlantic Ave.
CHICAGO, 84-86-88 Franklin St.
NEW YORK, Schieren Building.
PITTSBURG, 205 Wood Street.
PHILADELPHIA, 226 North 3d St.
HAMBURG, GERMANY, Auf dem Sande 1.
OAK LEATHER TANNERIES, Bristol, Tenn.
BROOKLYN, N. Y., Cor. 13th St. and 3d Ave.

HIGH GRADE

Auto Leather

Complete Line for

Upholstering, Tops, Fenders, etc.

Sample Books showing all colors sent manufacturers on request. *Prompt deliveries.*

Rex Imperial Leather Co.

12-28 Chapel Street, NEWARK, N. J.

The M·L·B Automobile Clutch Leather
—PATENT ALLOWED—

ARE you interested in a Leather Facing which will not burn?

SOMETHING NEW in a LEATHER FACING for AUTOMOBILE CLUTCH CONES.

An absolutely straight, endless band of leather put on a conical faced clutch member by proper expansion and contraction of the leather.

We instruct you how to put them on and guarantee them in every way.

Absolutely even in thickness and requiring no turning or trueing after being put on.

We manufacture Leather Facings any size or thickness and make them endless with waterproof and oilproof cement.

In using the M. L. B. Clutch Facing you require only about one-half the number of rivets that are now used with facings cut on an arc, and you bore the rivet holes through the metal and leather in one operation.

If you are interested in an economical leather and something which will give you better satisfaction than anything you have ever used, send us a trial order.

Milwaukee Leather Belting Company

MILWAUKEE, WISCONSIN

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LEATHER (Continued)

NATURAL LEATHER (Continued)

TERWILLIGER-STONE Leather Co., 210 N. J. R. R. Ave., Newark, N. J.

TURNER & Rutter, 32 Spruce St., New York, N. Y.

WARD & Co., E. S., 414 Freilinghuysen Ave., Newark, N. J.

WING Co., Charles, Amesbury, Mass. (Dealers.)
(See page 733.)

RAWHIDE LACE LEATHER

(For preventing motor hoods or bonnets from rattling)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

GAY, Fred E., 170 Front St., Pawtucket, R. I.

GRATON & Knight Mfg. Co., Worcester, Mass.
(See page 385.)

JILLSON, O. A., Pawtucket, R. I.

KELTON-BRUCE Mfg. Co., 9-13 Franklin St., Salem, Mass.

LADEW, Est. of Edw. R., 82-84 Fulton St., New York, N. Y.

MISSOURI Belting Co., St. Louis, Mo.

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

NORWICH Belt Mfg. Co., Norwich, Conn.

RAHMANN & Co., Geo., 6 Ferry St., New York, N. Y.

RICHMOND Leather Mfg. Co., 2201-07 E. Cary St., Richmond, Va.

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

WEATHERHEAD-THOMPSON Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H.

LEGGINGS

MOTORISTS LEGGINGS

COOK & Bro., E. C., 326-30 Kinzie St., Chicago, Ill.

EAST Hampton Bell Co., East Hampton, Conn.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y.
(See page 441.)

SYRACUSE & Eldridge Glove Co., 924 S. Salina St., Syracuse, N. Y.

WILEY & Son Co., Wm. H., 1217 Main St., Hartford, Conn.

LEVERS

BRAKE AND GEAR SHIFT LEVERS

(Finished or Machined Levers. For levers in the rough—See Castings; also Forgings)

AUTO Parts Mfg. Co., Muncie, Ind. "B. T. K."

B. T. K.—See Auto Parts Mfg. Co.

BERRY, Chas. W., Gray, Me.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

COTTA Transmission Co., Rockford, Ill.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

FALLS Machine Co., Sheboygan Falls, Wis.
(See page 589.)

HAZARD Motor Mfg. Co., 23 Scherer St., Rochester, N. Y.
(See page 579.)

INDIANA Auto Parts Co., 33d & Nebraska Sts., Marion, Ind.

JAMESVILLE Mfg. Co., Jamesville, N. Y.

JOHNSON Service Co., Milwaukee, Wis.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

KRUPP—See Prosser & Son.

McCUE Co., Hartford, Conn.
(See pages 71 and 291.)

MURRAY Machine Works, 1924 Wabansia Ave., Chicago, Ill.
(See page 557.)

PIPER Machine Co., 307-09 W. Maryland St., Indianapolis, Ind.

PROSSER & Son., Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Fifth St. & Sampson Ave., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 151.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

LIGHTERS

ACETYLENE LAMP LIGHTERS

(For lighting headlights from the seat by electricity)

ADJUSTABLE Lighter Co., 18 Pearl St., Newton, Mass.

AUTOMOBILE Lamp Lighter Co., 120 S. Main St., Elkhart, Ind.

AUTOMOBILE Lighting Co., Springfield, Mass. "Frary."
(See page 265.)

C. H.—See Haase Motor Works.

CHAMPION Igniter Co., 385 Boylston St., Boston, Mass. "Koehler."
(See page 753.)

ELECTRIC Goods Mfg. Co., Canton, Mass. "Gems," "Jewel," "Perfex."
(See page 741.)

ELLIOTT Auto-Lighter Co., 422 N. Charles St., Baltimore, Md.
(See page 753.)

FLASH—See Motor Specialties Co.

FRARY—See Automobile Lighting Co.

GEM—See Electric Goods Mfg. Co.

HAASE Motor Works, 1017 Lloyd St., Milwaukee, Wis. "C. H."

HART Gas Light Igniter Co., 350-58 Main St., Hartford, Conn.
(See page 753.)

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O'Bannon Auto Leather

1911 Styles

Suitable for Tops, Upholstering and Accessories

Best Artificial Leather on the Market

WRITE FOR SAMPLES AND PRICES

Manufactured and Sold by

The O'Bannon Corporation

72 Duane Street **NEW YORK**

MOHAIR

Genuine Mohair, Lustre Wool
or Imitation Mohair

ARTIFICIAL LEATHER

Manufactured and Combined by

FABRIKOID WORKS

NEWBURGH, N. Y.

Owned by E. I. du Pont de Nemours Powder Company

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LIGHTERS (Continued)

ACETYLENE LAMP LIGHTERS (Continued)

INST Lighter Co., Columbus, O.

INTERNATIONAL Mfg. Co., 201-03 National Marine Bank Bldg., Baltimore, Md.

JEWEL—See Electric Goods Mfg. Co.

KOEHLER—See Champion Igniter Co.

LOCKE Regulator Co., 76 North St., Salem, Mass. "Presto."

MOTOR Specialties Co., Motor Mart, Boston, Mass. "Flash." (See page 363.)

PERFEX—See Electric Goods Mfg. Co.

PRESTO—See Locke Regulator Co.

SAFETY Gas Lighter Co., 26-28 Wingate St., Haverhill, Mass.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Spark-O-Lite."

SPARK-O-LITE—See Sager Co.

WILSON Mfg. Co., H. K., New Bedford, Mass.

ELECTRIC CIGAR LIGHTERS

COWLES & Co., C., New Haven, Conn. (See page 351.)

METAL Specialties Mfg. Co., 427-41 W. Randolph St., Chicago, Ill. "Presto."

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y. (See page 439.)

PRESTO—See Metal Specialties Mfg. Co.

OIL LAMP LIGHTERS

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago Ill. (See page 255.)

LIGHTS

ELECTRIC DOME LIGHTS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco." (See page 639.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

ENGLISH & Mersick Co., New Haven, Conn.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill. (See page 255.)

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y. (See page 257.)

HOLT & Beebee, 40 Sudbury St., Boston, Mass. (See page 257.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.)

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y. (See page 439.)

PARRY & Co., A. N., Amesbury, Mass.

STORAGE Battery Supply Co., 241 E. 27th St., New York, N. Y.

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

ELECTRIC GAUGE LIGHTS

(See Lamps, Electric Dash)

ELECTRIC HEADLIGHTS

(See Headlights, Electric)

PORT LIGHTS

DIEM, Gus A., 20 Fulton St., New York, N. Y.

DURKEE & Co., Chas. D., 2 South St., New York, N. Y.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

NEPTUNE Hardware Mfg. Co., 54 South St., New York, N. Y.

PETERSEN Co., C. F., 29 S. Seventh St., Philadelphia, Pa. "Standard."

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

STANDARD—See Petersen Co.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WASH STAND LIGHTS

(For Lighting Car on Wash Stand.)

ALADDIN—See Smith Mfg. Co.

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

LEVERIDGE, Charles W., 183 Greenwich St., New York, N. Y.

SMITH Mfg. Co., I. J., 4281 Park Ave., New York, N. Y. "Aladdin." (See page 527.)

LINING

BRAKE LINING

(See Banding, Brake; also Leather, Friction; also Fibre, Hard)

LINOLEUM

AMERICAN Linoleum Mfg. Co., 366 Fifth Ave., New York, N. Y.

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

BLABON Co., Geo. W., 21st St. & Hunting Park Ave., Philadelphia, Pa.

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THE LATEST AND MOST SATISFACTORY LIGHTING DEVICE SOLD!

MORE LIGHT
LESS COST
MORE CONVENIENCE

The FRARY LIGHTING SYSTEMS

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The result of years of experiment and effort. Its advantages are—1—All lights on Auto under perfect control of driver from seat of car. 2—Highest lighting efficiency—lowest gas consumption. 3—Uniform low pressure on complete system. 4—Simple, strong construction—allows years of use without undue wear. 5—A twenty-five per cent saving in gas. 6—Adds much to the pleasure and safety of automobiling.

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$12 to $50
Completely Equipped

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THE AUTOMOBILE LIGHTING COMPANY
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Especially adapted for floors and running boards of Automobiles, also Motor Boats.

NON-SLIPPERY NOISELESS SANITARY

Not affected by Gasoline, Oil or Grease. Made in most any color.

Samples and prices furnished upon request.

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NAIRN'S
REGISTERED TRADE MARK

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NEW YORK

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LINOLEUM (Continued)

COOK'S Linoleum Co., Trenton, N. J.

FARR & Bailey Mfg. Co., Camden, N. J.

LIN-RHUBER—See Nairn Linoleum Co.

MONARCH Rubber & Oil Cloth Co., 41 N Seventh St., Philadelphia, Pa.

NAIRN Linoleum Co., Newark, N. J. "Lin-Rhuber." (See page 265.)

NATIONAL Linoleum Mfg. Co., Trenton, N. J.

POTTER, Sons & Co., Thomas, 522 Arch St., Philadelphia, Pa.

LOCKS

AUTOMOBILE LOCKS

(For Locking Steering Gears or Gear Levers)

CAMPBELL, A. U., 217-29 21st St., Toledo, Ohio.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn. (See page 369.)

GENERAL Utility Co., 121 N. 13th St., Philadelphia, Pa. "Parker."

KELSEY & Co., F. H., 408 Frankfort Ave., N. W., Cleveland, O. "Saunders."

MILLER Hardware Co., T. T., 30-32 N. Fourth St., Easton, Pa. (See page 235.)

PARKER—See General Utility Co.

ROCHESTER Safety Lock Co., 530 Main St., Rochester, Ind.

SACHS-LANDERS Mfg. Co., San Francisco, Cal.

SAUNDERS—See Kelsey & Co.

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y. (See page 267.)

CABINET LOCKS

CORBIN Cabinet Lock Co., New Britain, Conn.

EAGLE Lock Co., Terryville, Conn.

READING Hardware Co., Reading, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y. (See page 267.)

DOOR LOCKS

BRAINERD Mfg. Co., (E. Rochester), Rochester, N. Y.

COWLES & Co., C., New Haven, Conn. (See page 351.)

ENGLISH & Mersick Co., New Haven, Conn.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

OAR AND ROW LOCKS

MALLEABLE Iron Fittings Co., Branford, Conn. (See page 349.)

MARINE Hardware Co., Peabody, Mass.

LOGS

MOTOR BOAT LOGS

DURKEE & Co., Chas. D., 2 South St., New York, N. Y.

MERRILL'S Sons, L., 66 South St., New York, N. Y.

NEGUS, T. S. & J. D., 140 Water St., New York, N. Y.

NICHOLSON Ship Log Co., 409 Superior Ave., N. W., Cleveland, O.

LOOPS

BRASS SNAP AND STRAP LOOPS

(See also Fittings, Top)

ATTWOOD Brass Works, Court St., Grand Rapids, Mich. (See page 351.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

CRANDAL, Stone & Co., Binghamton, N. Y.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MURPHY Co., G. W. J., Merrimac, Mass.

NORTH & Judd Mfg. Co., New Britain, Conn.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y. (See page 439.)

ORMSBY Auto Strap Loop Co., Xenia, O. (See page 267.)

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

LUBRICANTS

OILS AND GREASES

(See Oils, Lubricating; also Greases, Cup and Gear)

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MANUFACTURERS OF

Lubricators, Oil Pumps, Indicators, Taxicab Oiling Devices

SPECIAL OILING DEVICES DESIGNED

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Why you should use Ormsby Strap Loops

Cheapest—Only two loops, eliminating snaps, buckles, stitching, leather laps, etc.

Most Convenient—Requires only one strap, doing away with the bother of fastening together two straps.

Neatest—Because it is simplicity itself.

Durable—Made of one piece malleable iron with roller.

Gives complete satisfaction. Makes larger profits.

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Cylinder Locks
For Motor Car Uses

Manufacturers and Owners: Add Yale Cylinder Locks and Padlocks to your car equipment. They are a convenience and a protection appreciated by every car-owner.

The Yale & Towne Mfg. Co. make locks suitable for every motor-car purpose, and capable of being easily fitted to any tool box, battery box, tail board, door or hood. They stand *watch* in the owner's absence.

You will find them on nearly all high-grade Cars today.

Write for free booklet "Motor Car Locks and Padlocks."

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LUBRICATORS

HAND LUBRICATORS OR OIL PUMPS

COX Brass Mfg. Co., Albany, N. Y.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

MECHANICAL LUBRICATORS OR OIL PUMPS

(Engine driven Oil Pumps)

BIDDISON Mfg. Co., 1516 Williamson St., Madison, Wis.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HILL—See Precision Appliance Co.

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 383.)

KINWOOD—See Kinsey Mfg. Co.

LAVIGNE Mfg. Co., 625 Commonwealth St., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McCANNA Mfg. Co., Waukegan, Ill.

McCORD Mfg. Co., Detroit, Mich. (See pages 58 and 59.)

MADISON-KIPP Lubricator Co., Madison, Wis.

MANZEL, Charles W., 89-93 Main St., Buffalo, N. Y. (See page 649.)

NEELY & Co., Edward, 829 Wells St., Chicago, Ill.

OSGOOD Lubricator Co., J. L., 121-38 Erie County Bank Bldg., Buffalo, N. Y.

PEDERSEN Lubricator Co., 636-44 First Ave., New York, N. Y. (See page 267.)

PRECISION Appliance Co., 2315-25 Austin Ave., Chicago, Ill. "Hill."

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

TERMAAT & Monahan Co., River St., Oshkosh, Wis.

WOOD, Geo., 19 Campfield St., Newark, N. J.

OIL AND GREASE CUP LUBRICATORS

(See Cups, Oil and Grease)

PRESSURE LUBRICATORS

DETROIT Lubricator Co. Lincoln Ave. & G. T. R. R., Detroit, Mich.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

KRAHN Mfg. Co., Milwaukee, Wis.

PEDERSEN Lubricator Co , 636-44 First Ave., New York, N. Y. (See page 267.)

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

WILKINSON Co., Wm. H., West Medway, Mass.

LUGS

TIRE LUGS

CLARK Novelty Co., Rochester, N. Y.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers.) "Hermetic."

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

HERMETIC—See Cryder & Co.

SCOVILL Mfg. Co., 99 Mill St., Waterbury, Conn.

STERLING Machine & Stamping Co., Wellington, O.

LUMBER

AEROPLANE LUMBER

YOUNGS & Bros., Wm. P., 616 First Ave., New York, N. Y.

AUTOMOBILE LUMBER

ANDERSON-Tully Co., Memphis, Tenn.

BAKER Lumber Co., Turrell, Ark.

CARRIER Lumber & Mfg. Co., Sardis, Miss.

HIMMELBERGER-HARRISON Lumber Co., Cape Girardeau, Mo.

HOFFMAN Bros. Co., Ft. Wayne, Ind.

LAMB-FISH Lumber Co., Charleston, Miss.

LUEHRMANN Hardwood Lumber Co., Chas. F., St. Louis, Mo.

SULLIVAN & Co., T., Niagara & Arthur Sts., Buffalo, N. Y.

THREE States Lumber Co., Memphis, Tenn.

MOTOR BOAT LUMBER

BLACKER & Shepard Co., 409 Albany St., Boston, Mass.

HAMMOND Co., Edw. J., 79 Milk St., Boston, Mass.

JORDAN Bros., Bank of Commerce Bldg., Norfolk, Va.

KELLS Sons Co., Thos., 240 India St., Brooklyn, N. Y.

ROPER Lumber Co., John L., Norfolk, Va.

WINDE, Henry J., 102-04 Beverly St., Boston, Mass.

YOUNGS & Bros., Wm. P., 616 First Ave., New York, N. Y.

MACHINE WORK

SPECIAL MACHINE WORK TO ORDER

(See also Screw Machine Products.)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Car & Ship Hardware Mfg. Co., New Castle, Pa.

AMERICAN Die & Tool Co., Reading, Pa.

Complete Index to Classification appears on Pages 8 to 22.

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 269.)

ATLAS Engine Works, Indianapolis, Ind.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich.
(See page 351.)

BAIRD Machine & Mfg. Co., 51-53 Fort St. E., Detroit, Mich.

BAY State Machine Co., Front St., Erie, Pa.

BETTCHER Mfg. Co., Cleveland, O.
(See page 623.)

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BLACK & Decker Mfg. Co., 113-15 S. Calvert St., Baltimore, Md.

BLAIR Tool & Machine Works, 24-27 West St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.
(See page 367.)

BLANCHARD Machine Co., 64 State St., Cambridge, Mass.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

BUDA Co., Railway Exchange Bldg., Chicago, Ill.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CANFIELD Brake Co., Corning, N. Y.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHESTER Engineering & Machine Co., Chester, Pa.
(See page 293.)

CHICAGO-RACINE Aluminum, Brass and Iron Works, 224-30 W. Huron St., Chicago, Ill.
(See page 351.)

CLARK Novelty Co., Rochester, N. Y.

CORBIN-CHURCH Co., New Britain, Conn.

CUMMINGS Machine Works, 110 High St., Boston, Mass.

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.
(See page 683.)

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

DIAMOND Chain & Mfg. Co., 281 West Georgia St., Indianapolis, Ind.
(See page 141.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

ERIE Auto Parts Co., 719 St. Clair Ave., N. E., Cleveland, O.
(See page 647.)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 581 and 584.)

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FORE River Shipbuilding Co., Quincy, Mass.

FORT Dearborn Mfg. Co., 63-65 Crossing St., Chicago, Ill.

FRIEDENWALD Bros., 214-18 N. Holliday St., Baltimore, Md.

FRIES & Co., Buffalo, N. Y.
(See page 725.)

FRONTIER Engineering Co., 816-36 Fort St., W. Detroit, Mich.

FROST Gear & Machine Co., Jackson, Mich.
(See page 575.)

FULTON Mfg. Co., Erie, Pa.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

GENERAL Foundry & Machine Co., Belden Ave. & Sand St., Syracuse, N. Y.

GEOMETRIC Tool Co., New Haven, Conn.

GIES Gear Co., 45 E. Fort St., Detroit, Mich.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 601.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HALE Motor & Machine Co., 654 Franklin St., Detroit, Mich.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn.
(See page 673.)

HILES & Co., C. A., 14th St. & Western Ave., Chicago, Ill.

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOLT Mfg. Co., W. H., 7 Eddy St., Providence, R. I.

HOUPERT, Henri J., 212 W. 68th St., New York, N. Y.
(See page 675.)

HUPP-TURNER Co., Lycaste St., & R. R., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

INGLE Machine Co., Rochester, N. Y.
(See page 553.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 225.)

JAEGER & Sword Mfg. Co., Millbrook, N. Y.

JOHNSON, J. W., Upper Sandusky, O.

JOHNSTON & Jennings Co., 877 Addison Rd., Cleveland, O.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KELLS Foundry & Machine Co., E. Gary, Ind.

KERMATH Mfg. Co., 45 Fort St. E., Detroit, Mich.

KING Mfg. Co., A. R., Kingston, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

KRAHN Mfg. Co., Milwaukee, Wis.

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MACHINE WORK
(Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LINK-BELT Co. Indianapolis, Ind.
(See page 611.)

LYCOMING Foundry & Machine Co., Williamsport, Pa.

M. A. N. Mfg. Co., Providence, R. I.

MANVILLE Bros. Co., 25-33 Benedict St., Waterbury, Conn.

MASSACHUSETTS Machine Shop Co., 100 Beacon St., Worcester, Mass.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

MIAMI Valley Machine Tool Co., 341 W. Germantown St., Dayton, O.

MICHIGAN Auto Parts Co., Junction & M. C. R. R., Detroit, Mich.

MICHIGAN Automobile Co., Kalamazoo, Mich

MILHOLLAND Machine Co., W. K., Tenth & Canal Sts., Indianapolis, Ind.

MODERN Machinery Co., Monroe & Fifth Sts., Wilmington, Del.

MOORE & Co., 310 W. Indiana St., Chicago, Ill.

MARROW Mfg. Co., Elmira, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MURPHY-POTTER Co., 366 Trombly St., Detroit, Mich.

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Engineering Co., Saginaw, Mich.

NATIONAL Sewing Machine Co., Belvidere, Ill.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

NIAGARA Brass Works, Buffalo, N. Y.

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y.
(See page 459.)

OLIN Gas Engine Co., Lock St., Buffalo, N. Y.

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PIPER Machine Co., 307-09 W. Maryland St., Indianapolis, Ind.

PROVIDENCE Engineering Works, Providence, R. I.
(See page 367.)

PRENTICE & Co., Geo. G., Lenox & Quinnipiac Aves., New Haven, Conn.

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y.

SAYRE Stamping Co., Sayre, Pa.

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

SHIMER & Sons, Samuel J., Milton, Pa.
(See page 487.)

SMITH Mfg. Co., Philip, Sidney, O.

SNOW Co., Benjamin W., 132 Bissell St., Syracuse, N. Y.
(See page 755.)

SOUTH Norwalk Engineering Co., S. Norwalk, Conn.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 313.)

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

TAFT-PEIRCE Mfg. Co., Woonsocket, R. I.
(See page 687.)

THROOP Perforating Co., 30 Terrace, Buffalo, N. Y.

TURNER Brass Works, Sycamore, Ill.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

VICTOR Iron Works Co., 523 Schofield Bldg., Cleveland, O.

WADE Machine Co., 287 Atlantic Ave., Boston, Mass.
(See page 271.)

WAINWRIGHT & Son, W. W., 16th St. & Western Ave., Connersville, Ind.

WALKER Machine Co., G. A., 51 Chardon St., Boston, Mass.

WALTER Machine Co., 186-94 Bellevue Ave., Detroit, Mich.

WARNER Bros. Machine Works, Muncie, Ind.

WESTERFIELD Motor Co., Anderson, Ind.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WIDMER Machine Works, 9-11 Canal Pl., New York, N. Y.

YORK Electric & Machine Co., 30 N. Penn St., York, Pa.

MAGNETS

PERMANENT MAGNETS

(For Magnetos)

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y.
(See page 639.)

ESTERLINE Co., 112 W. Main St., LaFayette, Ind.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.)
(See page 390.)

SANGAMO Electric Co., Springfield, Ill.

MAGNETOS

IGNITION MAGNETOS AND DYNAMOS

AMERICAN Mfg. Co., Meriden, Conn.
(See page 639.)

APLCO—See Apple Electric Co.

APPLE—See Dayton Electrical Mfg. Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 639.)

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MANGANESE BRONZE
PHOSPHOR BRONZE
AND ALUMINUM
CASTINGS

LUMEN BEARING
COMPANY
BRASS FOUNDERS
BUFFALO — TORONTO

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BABBITT METALS

To your formula or ours

Our name is a standard everywhere.

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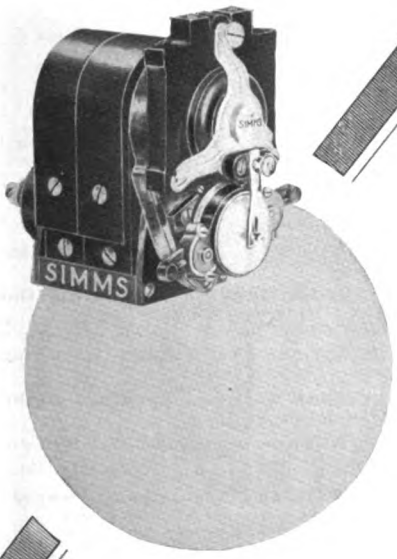

SIMMS MAGNETOS

A Reputation That Stands for Something

SIMMS Magnetos have earned the respect of motorists for invariable *Efficiency* and *Reliability* and every magneto we turn out is made with the sole idea of adding to this reputation.

THE SIMMS MOTOR STARTER is used in connection with the standard Simms Magneto and starts the motor without cranking.

SIMMS
TRADE MARK
QUALITY
EFFICIENCY RELIABILITY

The SIMMS MAGNETO Co.

1780 Broadway New York City

London Representative:
Simms Magneto Co., Ltd.

Paris Representative:
Cie des Magnetos Simms

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MAGNETOS (Continued)

IGNITION MAGNETOS AND DYNAMOS (Continued)

AUTO SPARKER—See Motsinger Device Mfg. Co.

BOSCH Magneto Co., 223-25 W. 46th St., New York, N. Y. (See page 279.)

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) "U. & H." (See page 81.)

BRIGGS Mfg. Co., Elkhart, Ind. (See page 767.)

BUFFALO Ignition Co., 41 E. Eagle St., Buffalo, N. Y. "Volta."

BULL-DOG—See Igniter Appliance Co.

CHAMPION Ignition Co., Flint, Mich. (See page 325.)

COMET—See Hendricks Novelty Co.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn. (See page 369.)

D.-K. Electric Co., 209-11 Chestnut St., St. Louis, Mo. "Duncan-Kaye."

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O. "Apple."

DOW Mfg. Co., Braintree, Mass.

DUNCAN-KAYE—See D.-K. Electric Co.

DUPLEX—See Economy Magneto Co.

DUPLEX Electric Co., 13 McWilliams St., Fond-du-Lac, Wis. (See page 771.)

ECONOMY Magneto Co., 17 E. Woodbridge St., Detroit, Mich. "Duplex."

ECONOMY Mfg. Co., 418 Park Bldg., Pittsburg, Pa. "Perfection."

EISEMANN Magneto Co., 225-27 W. 57th St., New York, N. Y. (Importers.)

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex." (See page 741.)

EUREKA—See Henricks Novelty Co.

FAWN River Mfg. Co., Constantine, Mich.

GARY Co., Theo. H., 41 Union Sq., New York, N. Y. (Importers.)

HEINZE Electric Co., Lowell, Mass.

HENRICKS Novelty Co., 314 W. Georgia St., Indianapolis, Ind. "Eureka," "Comet."

HERCULES Electric Co., 2128-36 Northwestern Ave., Indianapolis, Ind. "Star," "Wizard."

HERZ & Co., Puck Bldg., New York, N. Y. (Importers.) (See page 335.)

HIGH Frequency Ignition Coil Co., 126½ E. Main St., Los Angeles, Cal. "Seeley."

HOLTZER-CABOT Electric Co., Boston, Mass. (See page 413.)

HOTSHOT—See Igniter Appliance Co.

HURD & Haggin, 316 Hudson St., New York, N. Y. "Le Pontois."

IGNITER Appliance Co., 309 Electric Bldg., Cleveland, O. "Bull-Dog," "Hotshot."

JACOBSON-BRANDOW Co., Pittsfield, Mass. (See page 413.)

K-W Ignition Co., 35 Power Ave., Cleveland, O

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Indianapolis, Ind. "Kingston."

LE PONTOIS—See Hurd & Haggin.

LUTZ-LOCKWOOD Mfg. Co., Aldena, N. J. "SX."

M. E. A.—See Marburg Bros.

MARBURG Bros., 1777 Broadway, New York, N. Y. (Importers.) "M. E. A."

MAVITY-SLEEPER Co., Fowler, Ind.

MENOMINEE Electric Mfg. Co., Menominee, Mich.

MICHIGAN Magneto Co., 117-19 Bagley Ave., Detroit, Mich. (See page 643.)

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Auto Sparker."

NATIONAL Coil Co., Lansing, Mich. (See page 245.)

PERFECTION—See Economy Mfg. Co.

PERFEX—See Electric Goods Mfg. Co.

PFANSTIEHL Electrical Laboratory, 119 State St., N. Chicago, Ill. (See page 677.)

PHILADELPHIA Timer & Machine Co., 51st St. & Lancaster Ave., Philadelphia, Pa. "Velos." (See page 413.)

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 277.)

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

RELIABLE Electric Mfg. Co., 419 W. South St., Indianapolis, Ind.

REMY Electric Co., Anderson, Ind. (See page 677.)

SX—See Lutz-Lockwood Mfg. Co.

SEELEY—See High Frequency Ignition Coil Co.

SIMMS Magneto Co., 1780 Broadway, New York, N. Y. (See page 275.)

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 719.)

STAR—See Hercules Electric Co.

STERLING Co., Lafayette, Ind.

STERLING Machine Co., Norwich, Conn. (See page 423.)

SWISS Magneto Co., 350 Wabash Ave., Chicago, Ill.

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Vim."

U. & H.—See Bretz Co.

VELOS—See Philadelphia Timer & Machine Co.

VIM—See Tritt Electric Co.

VOLTA—See Buffalo Ignition Co.

WEBSTER Electric Co., Tiffin, O. "Webster-Milton."

WEBSTER-MILTON—See Webster Electric Co.

WHISLER Mfg. Co., 52 Larned St. W., Detroit, Mich.

WIZARD—See Hercules Electric Co.

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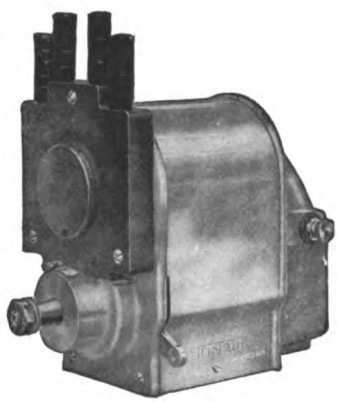
PITTSFIELD

Ignition Devices

HIGH TENSION MAGNETO

PERFECTED AND WARRANTED

We claim for our 1911 Magneto that it will do what any other High Tension Magneto will do, and in addition thereto will give an efficient Arc Flame Spark at 50 R. M., thus starting the Engine as easily with Magneto as with Coil. No other Magneto made has equalled this performance. Try one and satisfy yourself.



We make the highest type of **Spark Coils, Spark Plugs, Switches, Timers and Distributors.**

Send for Catalogue and Pamphlets.

PITTSFIELD SPARK COIL CO., Dalton, Mass.

SALES REPRESENTATIVES—NEW ENGLAND, W. J. Connell, 36 Columbus Ave., Boston. ATLANTIC STATES, Thomas J. Wetzel, 17 W. 42d St., New York. CENTRAL STATES, K. Franklin Peterson, H. V. Greenwood, 166 Lake Street, Chicago. MICHIGAN, L. D. Bolton, 319 Hammond Building, Detroit. PACIFIC COAST, Chanslor & Lyon Motor Supply Co., San Francisco and Los Angeles, Cal.

THE AMERICAN PRODUCT THAT DEFIES EUROPE

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MANIFOLDS

INTAKE AND EXHAUST MANIFOLDS

(Brazed and Welded Manifolds. For Cast Manifold —See Castings)

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn. (See page 383.)

BADGER & Sons Co., E. B., 63-75 Pitts St., Boston, Mass.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

NATIONAL Pipe Bending Co., New Haven, Conn. (See page 161.)

NATIONAL Welding & Mfg. Co., 1418-30 Niagara St., Buffalo, N. Y.

NORTH Tonawanda Musical Instrument Co., North Tonawanda, N. Y.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn. (See page 383.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

MAPS

ROAD MAPS

AUTOMOBILE Blue Book Publishing Co., 239 W. 39th St., New York, N. Y.

BALDWIN Mfg. Co., 143 Federal St., Boston, Mass.

CARON, J. V., Haverhill, Mass.

CLASON Map Co., 1515 Tremont Pl., Denver, Colo.

FARMER & Co., Silas, 29-31 Monroe Ave., Detroit, Mich.

MENDENHALL, C. S., Race St. & Opera Pl., Cincinnati, O.

RHODES Co., J. B., Kalamazoo, Mich.

SURVEY Map Co., 428 Lafayette St., New York, N. Y.

WALKER Lithograph & Publishing Co., 400 Newbury St., Boston, Mass.

MATTING

ALUMINUM MATTING

ALUMINUM Co. of America, Pittsburg, Pa.

METALLIC Automobile Matting Co., 281 Mill St., Rochester, N. Y.

COCOA MATTING

DARRAGH & Small, 177 Water St., New York, N. Y.

EAST India Mfg. Co., Baltimore, Md.

GREENLAND Cocoa Matting Co., 60 Gold St., Brooklyn, N. Y.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

KEMPF & Bro., Geo. F., 1024 N. Fourth St., Philadelphia, Pa.

McCABE & Bro., Benj., 56 Franklin St., New York, N. Y.

RANCOCAS Mills, Trenton, N. J.

MATS

RUBBER MATS

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

BARNARD Rubber Co., Wm. H., 257 S. 4th St., Philadelphia, Pa.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Lenox," "Tiger."

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

DIAMOND Rubber Co., Akron, O. (See page 139.)

EMPIRE Rubber Mfg. Co., Trenton, N. J.

GOODRICH, Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J. (See page 385.)

LENOX—See Boston Woven Hose & Rubber Co.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Rubber Co., Mansfield, O.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

TIGER—See Boston Woven Hose & Rubber Co.

VICTOR Rubber Co., Springfield, O.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

WALPOLE Rubber Co., Walpole, Mass.

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High-Class BOSCH-EQUIPPED MOTOR CARS AND TRUCKS

Abbott-Detroit
Alco
Alden Sampson
Allen Kingston
American
Am. La-France
American Lockport
Ames
Amplex
Armleder
Atlas
Atterbury
Auburn
Autocar
Autogo
Avery
Babcock
Badger
Bailey
Belden
Benz
Bergdoll
Berkshire
Berliet
Bianchi
Brush
Burg
Carhartt
Club Car
C. G. V.
Cadillac
Chadwick
Chalmers
Chase
Clement-Bayard
Coates-Goshen
Colburn
Colby
Cole
Columbia
Comet
Courier
Crane
Croce
Croxton-Keeton
Cunningham
Darracq
Day
De Dietrich
Deal
Decauville
De Dion-Bouton
Delahaye
Delaunay-Belleville
Denniston
Detroit-Dearborn
Diamond T.
Dorris
Durocar
Everitt
F. A. L.
Falcon-Ninety
Fiat
Findlay "40"
Franklin
Frayer-Miller
Frontenac
Gabriel
Gaeth
Gaggenau
G. J. G.
Glide
Great Smith
Great Southern
Grout
Havers
Haynes
Halladay
Herreshoff
Hewitt
Holtz
Houpt
Hudson
Hupmobile
Ideal
Isotta
Itala
Jenkins
Jonz
Kelly
Kissel
Kline Kar
Klink
Knox
K-r-i-t
La Buire
Lancia
Lexington
Locomobile
Lozier
Luverne
McIntyre
Mack
Marion
Marmon
Matheson
Mercedes
Mercer
Metz Plan
Metzger
Monitor
Moon
Mora
Moyer
Nagant
Napier
National
Neilson
Nott
Oldsmobile
Otto
Owen
Paige-Detroit
Palmer-Singer
Parry
Peerless
Pennsylvania
Penn Unit
Peugeot
Pierce-Arrow
Pittsburgh Six
Planche
Pope-Hartford
Pratt Elkhart
Premier
Primo
Pullman
Pungs Finch
Rainier
Rambler
Randolph
Rapid
Rayfield
Reliance
Renault
Republic
Rider-Lewis
Rockwell
Rogers
Rolls-Royce
Royal Tourist
Russell
S. G. V.
S. P. A.
S. P. O.
Sanbert
Sayers & Scovill
Schacht
Schlosser
Seagrave
Selden
Sharp-Arrow
Sibley "20"
Simplex
Spaulding
Speedwell
Spoerer
Springfield
Stafford
Staver
Stearns
Sternberg
Stevens-Duryea
Stilson
Stoddard-Dayton
Streator
Studebaker
Sultan
Sunset
Swift
The Capitol
The Only Car
Thomas
Thomas M. Cab
Tourist
Tuite
Universal
Virginian
Walter
Warren-Detroit
Washington
Wayne
Welch
Westcott
Westinghouse
W. F. S.
White
Wilcox
Willys-Overland
Winton
Wisco
Wood
Woodworth
Zust

The list of Bosch Equipped Cars we published a year ago contained the names of 115 manufacturers who equipped with Bosch.

The above list (complete at March 1, 1911) shows 205 makers of cars and trucks using Bosch.

90 more manufacturers use Bosch than did last year.

Bosch Equipped Cars and Trucks are in Demand

BOSCH MAGNETO COMPANY

Chicago Branch: 119-121 East 24th Street.
San Francisco Branch: 357 Van Ness Avenue.
Detroit Branch: 878 Woodward Avenue.
Toronto Branch Just Opened.

223-225 West 46th Street
New York

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MATS (Continued)

STEEL MATS

ACME Steel Goods Co., 2834 Archer Ave., Chicago, Ill.

CARY Mfg. Co., 19-21 Roosevelt St., New York, N. Y.

WORTH Wire Works, Kokomo, Ind.

MEGAPHONES

COWLES & Co., C., New Haven, Conn (See page 351.)

MERRIMAN Bros., 185 Amory St., Boston, Mass.

PRATT, Z. I., 154 W. 27th St., New York, N. Y.

METALS

BEARING METALS

A. B. C. Castings Co., Cleveland, O. "Meteor." (See page 125.)

ACORN—See Cadman Mfg. Co.

ALLEN-MURPHY, Co., 4013-17 Wentworth Ave., Chicago, Ill.

ALLOYS Founding Co., Perry & Illinois Sts., Buffalo, N. Y. (See page 317.)

ALUMINUM Castings Co., Cleveland, O. (See page 129.)

AMERICAN Bronze Co., Berwyn, Pa. "Non-Gran." (See page opposite inside front cover.)

AMERICAN Bronze Co., Buffalo, N. Y.

AMERICAN Manganese Bronze Co. (Holmesburg), Philadelphia, Pa. "Spare's."

AZALEA—See Vanadium Metals Co.

BIRKENSTEIN & Sons, S., 377-409 Ontario St., Chicago, Ill. (See page 479.)

CADMAN Mfg. Co., A. W., Smallman & 28th Sts., Pittsburg, Pa. "Acorn."

CHALLINGE Brass Co., 501 Quinnipiac Ave., New Haven, Conn.

CLUM & Atkinson, Rochester, N. Y. "Superior," "Plata." (See page 281.)

COLUMBIA Smelting & Refining Works, 365-67 West St., New York. N. Y.

CRAMP & Sons Ship & Engine Building Co., Wm., Philadelphia, Pa. "Parsons." (See page 281.)

DAMASCUS Bronze Co., Pittsburg, Pa.

DAWSON Hardened Copper Co., 123 Liberty St., New York, N. Y.

EDNA Smelting & Refining Co., 525-31 Hunt St., Cincinnati, O.

ELEPHANT—See Phosphor Bronze Smelting Co.

EMPIRE Metal Co., Syracuse, N. Y. "Premier," "Triumph."

ERIE White Metal Co., Erie, Pa.

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo. "Solas."

EUREKA Tempered Copper Works, North East, Pa.

FAHRIG Metal Co., 316-22 Hudson St., New York, N. Y.

FORT Hill Bronze Co., 48-56 Waters Ave., West Everett, Mass.

FRICTIONLESS Bushing Co., 312 W. 43d St., New York, N. Y.

FRICTIONLESS Metal Co., Chattanooga, Tenn.

GARDINER Metal Co., 1356-64 W. Lake St., Chicago, Ill.

GRAINLESS—See American Bronze Co.

HECLA—See Paulson & Son.

HOYT Metal Co., Merchants-LeClede Bldg., St. Louis, Mo.

LE GRAND Bronze Co., 417-19 Berckman St., Plainfield, N. J.

LIGHT Mfg. & Foundry Co., Pottstown, Pa. (See page 691.)

LUMEN Bearing Co., Buffalo, N. Y. (See pages 273 and 274.)

LUNDHAVEN Brass Foundry Co., 41-45 Litchworth St., Buffalo, N. Y.

MAGNOLIA Metal Co., 113-15 Bank St., New York, N. Y.

MERCHANT & Evans Co., Philadelphia, Pa.

METEOR—See A. B. C. Castings Co.

MOGUL Metal Co., Detroit, Mich. (See page 681.)

MORE-JONES Brass & Metal Co., 3132-44 N. Broadway, St. Louis, Mo.

MURPHY-POTTER Co., 366 Trombly St., Detroit, Mich.

MUZZY-LYON Co., Detroit, Mich. (See page 681.)

NATIONAL Lead Co., 111 Broadway, New York, N. Y. (See page 551.)

NEW Era Mfg. Co., Kalamazoo, Mich.

NON-GRAN—See American Bronze Co.

NORTH American Smelting Co., Ninth & Thompson Sts., Philadelphia, Pa.

PALMETTO Reduction Co., 2023 Emerson Ave., Chicago, Ill.

PARSONS—See Cramp & Sons.

PAULSON & Son, Thos., 95-107 Second Ave., Brooklyn, N. Y. "Hecla." (See page 349.)

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant." (See page 543.)

PITTSBURGH White Metal Co., 3116-18 Penn Ave., Pittsburg, Pa.

PLATA—See Clum & Atkinson.

PREMIER—See Empire Metal Co.

REEVES & Son, Paul S., 1415-25 Catherine St., Philadelphia, Pa.

SEMPER IDEM—See Wildes Son, Thomas.

SHONBERG, I., 363 Hudson Ave., Brooklyn, N. Y.

SOLAR—See Eureka Brass Co.

SPARE'S—See American Manganese Bronze Co.

SUPERIOR—See Clum & Atkinson.

SYRACUSE Smelting Works, 149-51 Jewell St., Brooklyn, N. Y.

TRIU'MPH—See Empire Metal Co.

U. S. Bronze Co., 1831 Columbus Road, Cleveland, O.

U. S. Reduction Co., Manhattan Bldg., Chicago, Ill.

VANADIUM Metals Co., Frick Bldg., Pittsburg, Pa. "Azalea." (See page 407.)

Complete Index to Classification appears on Pages 8 to 22.

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SPECIFY

SUPERIOR BABBITT

FOR YOUR

Die Cast Bearings

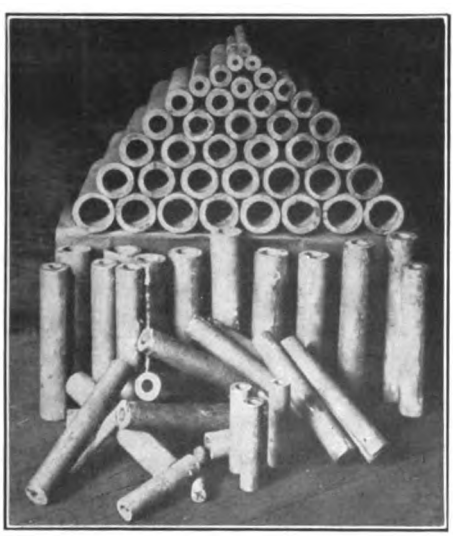
USED IN LEADING CARS

MADE ONLY BY

CLUM & ATKINSON, ROCHESTER, N. Y.

Handled by Principal Die Casters.

CORED BARS FOR BUSHINGS



List of cored and solid cast bars of our bearing metals in stock:

Number.	Outside Diameter. Inches.	Inside Diameter. Inches.	Length. Inches.
1	1	¼	6
2	1¼	½	6
3	1½	¾	6
4	1¾	¾	12
5	1¾	1	12
6	2	1	12
7	2	1¼	12
8	2¼	1	12
9	2¼	1¼	12
10	2½	1¼	12
11	2½	1½	12
12	2¾	1½	12
13	2¾	1¾	12
14	3	2	12
15	3	2¼	12
16	3¼	2¼	12
17	3¼	2½	12

Solid bars up to 2 inches diameter.

Furnished either in PARSONS' WHITE BRASS or CRAMP'S SPECIAL BEARING BRONZE. Sizes of bars not shown in the list and cored whole and half bushings with end collars can be furnished from stock patterns. In ordering refer to the number in first column.

THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING CO.
PHILADELPHIA, PA.

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METALS (Continued)

BEARING METALS (Continued)

WILDES Son, Thomas, 14 Dover St., New York, N. Y. "Semper Idem."

WILLIAMS & Son, E. A., 105 Plymouth St., Jersey City, N. J.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

WOLFF Metal Co., 1803-11 John St., Cincinnati, O.

PERFORATED METALS

AITCHISON Perforating Co., 303 Dearborn St., Chicago, Ill.

HARRINGTON & King Perforating Co., 612-30 N. Union St., Chicago, Ill.

MUNDT & Sons, Chas., 53-57 Fairmount Ave., Jersey City, N. J.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis. (See page 419.)

THROOP Perforating Co., 30 Terrace, Buffalo, N. Y.

METERS

COMPRESSION METERS

(See Gauges, Cylinder Compression)

DISTANCE RECORDING METERS OR ODOMETERS

(For Combined Odometers and Speedometers—See Speedometers)

CAHILL Auto Works, 346 W. 53d St., New York, N. Y.

JONES Speedometer Co., New Rochelle, N. Y.

STAR Speedometer Co., Milton, Pa.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

GRADE METERS

ADAMS Co., Dubuque, Ia. "Gradometer."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

GRADOMETER—See Adams Co.

SCHAEFFER & Budenberg Mfg. Co., 963-65 Kent Ave., Brooklyn, N. Y.

SPEED METERS

(See Speedometers)

TAXIMETERS

(See Taximeters)

MICA

AMERICAN Mica Co., Newton Lower Falls, Mass.

ASHEVILLE Mica Co., Asheville, N. C.

CHICAGO Mica Co., Valparaiso, Ind.

DIELECTRIC Mfg. Co., 224 S. Vandeventer Ave., St. Louis, Mo.

LAURENTIDE Mica Co., Lincoln, Neb.

MICA Mfg. Co., 150-52 Chambers St., New York, N. Y.

MUNSELL & Co., Eugene, 68 Church St., New York, N. Y.

NEW York Mica & Mfg. Co., Auburn, N. Y.

SCHOONMAKER, A. O., 221 Fulton St., New York, N. Y.

UNITED Mica Co., Grafton Center, N. H.

VANCE, D. T., Plumtree, N. C.

WATSON Bros., 170 Purchase St., Boston, Mass.

MIRRORS

ADJUSTABLE DASHBOARD MIRRORS

(To enable driver to see to the rear of the car)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y. "Mirrorscope."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

ARGOS—See Motor Car Equipment Co

ATLAS—See Toffler Co.

AUTOCRAT—See American Thermo Ware Co.

BALZER Co., Gus., 1777 Broadway, New York, N. Y.

BELLAMY—See Novelty Mfg. Co.

COX Brass Mfg. Co., Albany, N. Y. "Reflectorscope."

ECKSTEIN, W. F., 1223 Michigan Ave., Chicago, Ill. "Friday's."

EVERSTICK Mirror Co., 250 W. 54th St., New York, N. Y.

FRIDAY'S—See Eckstein, W. F.

GOODWIN & Kintz Co., Winsted, Conn.

HOLT & Beebee, 40 Sudbury St., Boston, Mass. (See page 257.)

HUDSON Auto Lamp Works, 1648-50 Broadway, New York, N. Y.

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

MIRRORSCOPE—See Alexander Mfg. Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.) "Argos."

NOVELTY Mfg. Co., Waterbury, Conn. "Bellamy."

REFLECTORSCOPE—See Cox Brass Mfg. Co.,

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SEARLS Mfg. Co., 27 Mulberry St., Newark, N. J.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y. "Atlas."

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MILWAUKEE ADJUSTABLE WIND SHIELD

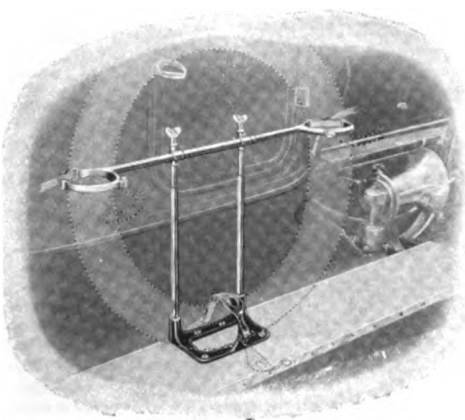
Can be set at any position desired. The height of Wind Shield perfection. Several other styles.

"Emergency" Mud-Hooks

The farmer will charge you the price of 2 sets to pull you out of one hole.

"Superior Grip" Tire Chains

Special hardened cross links. FOR SALE everywhere.



"Fore Door" Tire Holder

Contained entirely on running board. Avoid drilling holes and disfiguring the body of the car. Adjustable to any size. STRONG, PRACTICAL, ORNAMENTAL.

A Few Other Live Specialties—Bumpers, Melody Horns, Screw Jacks, Robe and Foot Rails, Grease Guns, Pedals, Vulcanizers, Top Specialties, Etc. : : :

SEND FOR OUR COMPLETE CATALOG OF LIVE SELLERS

GARAGE EQUIPMENT MFG. CO., 742 So. Pierce Street MILWAUKEE, WIS.

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MIRRORS (Continued)

WATER GAUGE MIRRORS

KNOX Co., Frank J., Hartford, Conn.

MONOGRAMS

ORNAMENTAL METAL MONOGRAMS

ABBOTT, W. H., 143 W. 42d St., New York, N. Y.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

CHICAGO Art Metal Works, 67 Lake St., Chicago, Ill.

CHILDS & Co., S. D., 279 E. Monroe St., Chicago, Ill.

COLGAN Co., J. W., Sudbury Bldg., Boston Mass.
(See page 355.)

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 363.)

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa.

GREENDUCK Co., Van Buren St. & Hoyne Ave., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANDEL, Louis, 138 Center St., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

HICKOK Mfg. Co., 32 St. Paul St., N., Rochester, N. Y.
(See page 285.)

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

JOHNSTON Co., J. G., 79 Sudbury St., Boston, Mass.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MULHAUPT, F. Jos., 227 N. Fifth St., Lafayette, Ind.

MURDOCK Co., James, Jr., 116 Opera Pl., Cincinnati, O.

REES, F. H., Granite Bldg., Rochester, N. Y.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

SALMAN, John A., 17 Bromfield St., Boston, Mass.

SCHRIDDE, Wm., 35 S. Clark St., Chicago, Ill.

SCHWERDTLE Stamp Co., 39-41 Cannon St., Bridgeport, Conn.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

WALTER & Sons, N. C., 194 William St., New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

MOTORS

ELECTRIC AUTOMOBILE MOTORS

DIEHL Mfg. Co., Elizabethport, N. J.
(See page 587.)

GENERAL Electric Co., Schenectady, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

GASOLINE AERONAUTIC MOTORS

ADAMS Co., Dubuque, Ia.

AERIAL Navigation Co. of America, Girard, Kans. "Call."

AEROMOTOR—See Detroit Aeronautic Construction Co.

ATKIN-WHEELER Co., New York Ave., Halesite, N. Y.

BATES & Heinemann, 131 N. Canal St., Chicago, Ill.

BOLAND Bros., 613 St. George Ave., Rahway, N. J.

BOSTON Aero Co., 410 Newbury St., Boston, Mass. "Goblin."

BOULEVARD Engine Co., 3932 Olive St., St. Louis, Mo.

CALL—See Aerial Navigation Co.

CAMERON Car Co., 60 River St., Beverly, Mass.

CURTISS Aeroplane Co., Hammondsport, N. Y.

DEAN Mfg. Co., 262 Front St., Newport, Ky. "Fox."

DETROIT Aeronautic Construction Co., ft. of Crane Ave., Detroit, Mich. "Aeromotor."

DETROIT Aeroplane Co., Detroit, Mich.

ELBRIDGE Engine Co., 22 Culver Rd., Rochester, N. Y. "Featherweight."

EMERSON Engine Co., Prince & Fairfax Sts., Alexandria, Va.

FEATHERWEIGHT—See Elbridge Engine Co.

FOX—See Dean Mfg. Co.

GOBLIN—See Boston Aero Co.

GOLDEN-BELKNAP & Schwarz Co., 1248 Grand River Ave., Detroit, Mich.

GREEN, Buel H., Los Angeles, Cal.

HALL-SCOTT Motor Car Co., Crocker Bldg., San Francisco, Cal.

HANSEN Auto & Machine Works, 450 S. Lake Ave., Pasadena, Cal. "Hansen-Snow."

HANSEN-SNOW—See Hansen Auto & Machine Works.

HARRIMAN Motor Works, S. Glastonbury, Conn.

HENDEE Mfg. Co., Springfield, Mass.

HOLBROOK-DECHENNE Aeroplane Co., Monett, Mo.

HOPKINS & De Kilduchevsky, 1531 Broadway, New York, N. Y.

JENCICK Motor Mfg. Co., 349 N. Main St., Port Chester, N. Y.

JOHNSON Bros. Co., Terre Haute, Ind.

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AJAX TIRES

GUARANTEED 5,000 MILES

The AJAX Guarantee represents the true, tangible and definite measure of AJAX QUALITY.

AJAX TIRES are made both in the Wrapped Tread and Extra-Heavy Non-Skid—the latter the only Non-Skid guaranteed for 5000 miles.

AJAX-GRIEB RUBBER CO.

General Offices—1796 Broadway, New York

Factories—Trenton, N. J.

BRANCHES:

New York, 1796 Broadway.
Boston, 15 Park Square.
Philadelphia, 316 No. Broad St.
Atlanta, 48 Auburn Ave.
Detroit, 743 Woodward Ave.
Chicago, 18th St. & Michigan Ave.
Kansas City, 1606 Grand Ave.
Minneapolis, 905 First Ave. So.
Denver, 1529 Cleveland Place.
Seattle, Pike St. & 10th Ave.
Portland, Ore., 329 Ankeny St.
Los Angeles, 1038 So. Main St.
San Francisco, Golden Gate & Van Ness Ave.

MONOGRAMS HICKOK

Dealers—Everywhere

A large portion of your customers would like a monogram on their car. Will you sell them and make a good profit?

No investment on your part. Write now to

The Hickok Mfg. Co., 38 St. Paul St., Rochester, N.Y

ARCO SPOTZOFF

The Metal Polish for Motor Brasses

National advertising campaign begins April 1st. Become a SPOTZOFF dealer and reap the benefit. Big sales and good profits.

Write at once for our attractive proposition to dealers.

The Atlantic Refining Company

2 WISE BLDG. CLEVELAND, OHIO

HIGH-GRADE ETCHED NAME PLATES

OUR SPECIALTY

AMERICAN NAME PLATE & MFG. CO.

15 MICHIGAN STREET CHICAGO, ILL.

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MOTORS (Continued)

GASOLINE AERONAUTIC MOTORS (Continued)

KIRKHAM, Chas. B., Bath, N. Y.

LEIGHTON, H. J., 1017 W. Fayette St., Syracuse, N. Y.

MICHIGAN Air Ship Co., Detroit, Mich. "Rotaero."

RINEK Aero Mfg. Co., Easton, Pa.

ROBERTS Motor Co., 1339 Columbus Ave., Sandusky, O.

ROTAERO—See Michigan Air Ship Co.

RUBEL, Jr., & Co., R. O., Louisville, Ky.

ST. LOUIS Car Co., St. Louis, Mo. "Smith."

SMITH—See St. Louis Car Co.

WRIGHT Co., Dayton, O.

GASOLINE AUTOMOBILE MOTORS

ADVANCE Power Co., 140 Dearborn St., Chicago, Ill.

AJAX Mfg. Co., Joliet, Ill.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ANDERSON Engine Co., Shelbyville, Ill.

ANDERSON Motor Co., 50 W. 16th St., Anderson, Ind.

ATLAS Engine Works, Indianapolis, Ind.

AUTO Parts Mfg. Co., Detroit, Mich. (See page 773.)

AUTOMOBILE Specialty Co., Anderson, Ind. "Stanley." (See page 577.)

BEAVER Mfg. Co., 789 Chase St., Milwaukee, Wis. (See page 293.)

BEILFUSS Motor Co., Lansing, Mich. (See page 579.)

BICKWELL Mfg. Supply Co., N. Academy St., Janesville, Wis.

BRENNAN Motor Mfg. Co., 193 Grape St., Syracuse, N. Y.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

CADY Co., C. N., W. Center St., Canastota, N. Y.

CARRICO—See De Tamble Motor Co.

CENTURY Electric Co., 1826 Olive St., St. Louis, Mo.

CHESTER Engineering & Machine Co., Chester, Pa. "Penn." (See page 293.)

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

CLARK Motor Co., E. C., E. LeRoy St., Jackson, Mich.

COLLINS Gear & Motor Co., 319 Frick Bldg., Pittsburg, Pa.

COMET Motor Works, 512 Monroe St., Chicago, Ill.

CONTINENTAL Engine Co., 129-31 N. Canal St., Chicago, Ill.

CONTINENTAL Motor Mfg. Co., Muskegon, Mich. (See page 291.)

CROSS Gear & Engine Co., Detroit, Mich. (See page 207.)

DART Mfg. Co., Waterloo, Ia. (See page 707.)

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis.

DE TAMBLE Motors Co., Anderson, Ind. "Carrico."

DERAINE Motor Co., 7500 Quincy Ave., Cleveland, O.

DESCHLER, August, 18-20 East Water St., Chillicothe, O.

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill.

FAIRBURY Motor Car Works, Main & Sixth St., Fairbury, Ill.

FALLS Machine Co., Sheboygan Falls, Wis. (See page 589.)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O. (See pages 581 and 584.)

FIELD-BRUNDAGE Co., 102-32 Belden Ave., Jackson, Mich.

FORT Wayne Auto Motor Co., Fletcher Ave. & Wabash Tracks, Fort Wayne, Ind.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GOLDEN-BELKNAP & Swartz Co., 1248 Grand River Ave., Detroit, Mich.

GRANT-FERRIS Co., Troy, N. Y.

GREENWALD Co., I. & E., 720 E. Pearl St., Cincinnati, O. (See page 759.)

HALE Motor & Machine Co., 654 Franklin St., Detroit, Mich.

HAZARD Motor Mfg. Co., 23 Scherer St., Rochester, N. Y. (See page 579.)

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y. (See page 585.)

HOLBROOK-ARMSTRONG Iron Co., 16th St. & Junction Ave., Racine, Wis. (See page 585.)

HYDRAULIC Engineering Works, 220 N. Jefferson St., Chicago, Ill. "Roxey."

ILLINOIS—See Moline Pump Co.

JENCICK Motor Mfg. Co., Port Chester, N. Y.

JOERNS-THEIM Motor Car Co., 2237 Hampden Ave., St. Paul, Minn.

JOHNSON Service Co., Milwaukee, Wis.

KENMORE Mfg. Co., Chicago, Ill.

KIRKHAM Motor Mfg. Co., Bath, N. Y.

MICHIGAN Automobile Co., Kalamazoo, Mich.

MICKELSON Motor Co., 128-30 Ferry St., Milwaukee, Wis.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

MODEL Gas Engine Works, Peru, Ind. (See page 577.)

MONARCH Motor Mfg. Co., 1592-1600 N. Halsted St., Chicago, Ill.

MOTOR & Mfg. Co., Indianapolis, Ind.

NIAGARA Gasoline Motor Co., 174 Breckenridge St., Buffalo, N. Y. (See page 579.)

NORTH Chicago Machine Co., North Chicago, Ill.

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.

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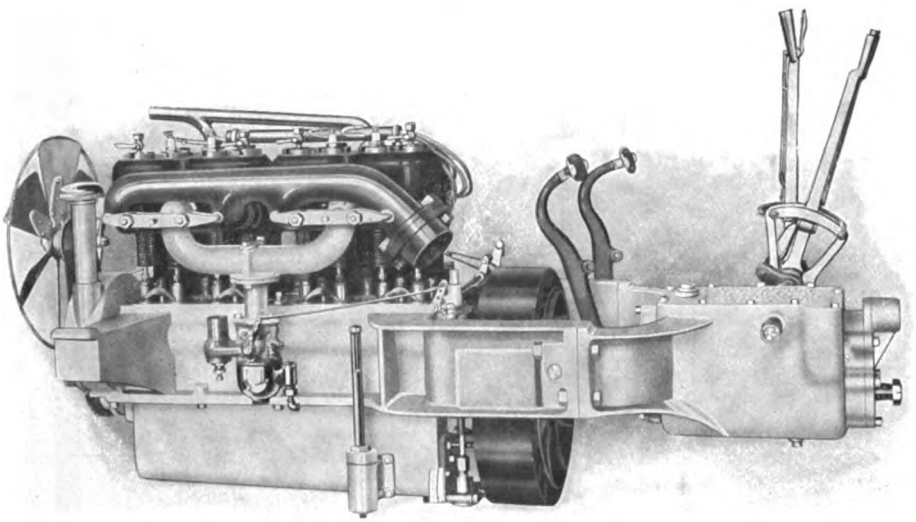
NOT THE CHEAPEST—BUT THE **BEST**

WAUKESHA MOTORS

3 Sizes—4 Cylinder

4" x 4" Type "I" 4¼" x 4¾" Type "A"
4¾" x 5" Type "H"



3-POINT SUSPENSION

Unit Power Plants

4" Bore, 4" Stroke, Type "IU4"
4¼" Bore, 4¾ Stroke, Type "AU4"

SEND FOR DESCRIPTIVE MATTER

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN

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MOTORS (Continued)

GASOLINE AUTOMOBILE MOTORS (Continued)

OSWALD Motor Co., 511-13 Roswell Ave., Goshen, Ind.

OTTO Gas Engine Works, 33d & Walnut Sts., Philadelphia, Pa.

OULTON Motor & Mfg. Co., 311 Atlantic Ave., Boston, Mass.
(See page 451.)

PARKER Motor Co., Hartford, Conn.
(See page 291.)

PENN—See Chester Engineering & Machine Co.

PIGGINS Bros., Racine, Wis.

PORT Huron Construction Co., Port Huron, Mich.

PROVIDENCE Engineering Works, Providence, R. I.
(See page 367.)

REEVES Pulley Co., Columbus, Ind.

REGAL Gasoline Engine Co., Coldwater, Mich.

ROBERTS Motor Co., 1339 Columbus Ave., Sandusky, O.

ROXEY—See Hydraulic Engineering Works.

RUGGLES Motor Co., Chicopee, Mass.
(See page 585.)

RUTENBER—See Western Motor Co.

SANDUSKY Auto Parts & Motor Truck Co., Sandusky, O.
(See page 63.)

SCHLOSSER Mfg. Co., 151 E. 126th St., New York, N. Y.
(See page 587.)

SCOTT-HARRIS Engine & Transmission Co., Board of Trade Bldg., Indianapolis, Ind.

SEAGER Engine Works, Lansing, Mich.
(See page 289.)

SMITH Motor Co., 1500 Hulman St., Terre Haute, Ind.

SOMMER Motor Co., Bucyrus, O.
(See page 587.)

STANLEY—See Automobile Specialty Co.

SWAIN Engine Co., 4105 Cottage Grove Ave., Chicago, Ill.

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O.
(See page 579.)

TORBENSEN Motor Car Co., Bloomfield, N. J.

TREBERT Gas Engine Co., Butler, Ind.

UNIVERSAL Machinery Co., 1916 St. Paul Ave., Milwaukee, Wis.

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis.
(See page 585.)

WARNER Mfg. Co., Toledo, O.
(See page 209.)

WAUKESHA Motor Co., Waukesha, Wis.
(See page 287.)

WESTERFIELD & Co., G. G., Henry & Senate Sts., Indianapolis, Ind.

WESTERN Motor Co., Marion, Ind. "Rutenber."
(See page 295.)

WESTINGHOUSE Machine Co. (E. Pittsburg), Pittsburg, Pa.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

WILLET Engine & Carbureter Co., 764 Ellicott Sq., Buffalo, N. Y.

WISCONSIN Machinery & Mfg. Co., Canal St. & Muskego Ave., Milwaukee, Wis.

WISCONSIN Motor Mfg. Co., Milwaukee, Wis.
(See page 593.)

GASOLINE MARINE MOTORS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill. "Humming Bird."

ANDERSON Engine Co., Shelbyville, Ind.

ANDERSON Motor Co., 50 W. 16th St., Anderson, Ind.

ARDMORE—See Keidel & Co.

ARISTOX—See Black Rock Machine Co.

ASTORIA Iron Works, Astoria, Ore. "Noyer-Fox."

ATLANTIC Co., Amesbury, Mass.

AUTO Engine Works, Rice & Fuller Sts., St. Paul, Minn. "Capitol."

AUTOMATIC Machine Co., 113 E. Washington Ave., Bridgeport, Conn.

B & L—See Blount & Lovell.

BARBER Bros., 500 E. Water St., Syracuse, N. Y.

BARKER, C. L., Norwalk, Conn.

BAY State Motor Works, 572 S. East St., Holyoke, Mass.

BEILFUSS Motor Co., Lansing, Mich.
(See page 579.)

BELLE ISLE—See Concrete Form & Engine Co.

BENTON Electric Co., 106-08 Pearl St., LaCrosse, Wis.

BLACK Rock Machine Co., ft. Hancock Ave., Bridgeport, Conn. "Aristox."

BLOUNT & Lovell, 96-102 High St., Boston, Mass. "B & L."

BOOTHBAY—See Rice Bros. Co.

BRENNAN Motor Co., 103 Grape St., Syracuse, N. Y.

BROWN Gas Engine Co., B. F., 412-16 Warren St., Schenectady, N. Y.

BROWN-TALBOT Machinery Co., 19 Oakland St., Salem, Mass.

BROWNELL Motor Co., F. A., 634-66 Lexington Ave., Rochester, N. Y.

BUCKSPORT Launch & Engine Works, Bucksport, Me. "Soper."

BUFFALO Gasoline Motor Co., Niagara & Auburn Sts., Buffalo, N. Y.

BULL PUP—See Consolidated C. S. M. Co.

CADY Co., C. N., W. Center St., Canastota, N. Y.

CAILLE Perfection Motor Co., 38 Amsterdam Ave., Detroit, Mich. "Perfection."

CALIFORNIA Motor Works, Center & Lindsay Sts., Stockton, Cal.

CAMDEN Anchor-Rockland Machine Co., Camden, Me. "Knox."

CAPITAL—See Fifield Bros. Co.

CAPITOL—See Auto Engine Works.

CENTRAL Machine Co., 708 Cherry St., Philadelphia, Pa. "Philadelphia."

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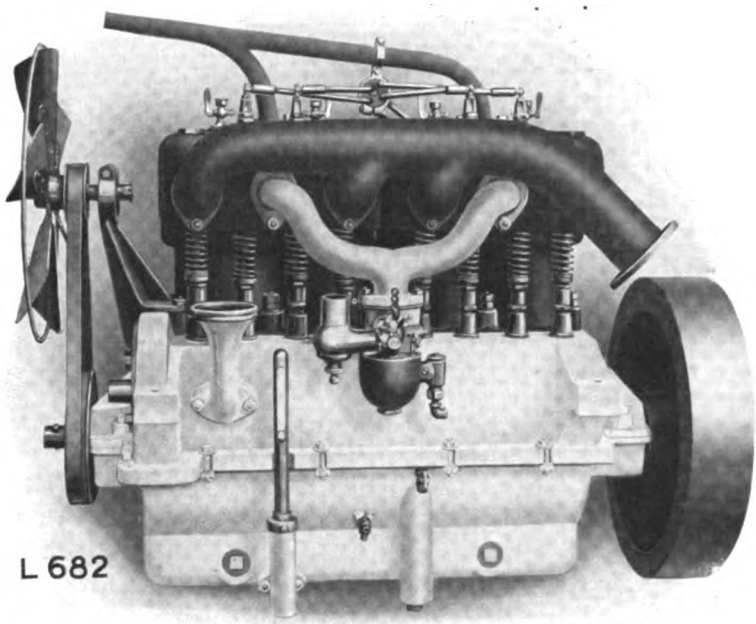
The Seager Engine



A High Grade Engine Specially Designed to Meet the Special Requirements of Automobile Service

The Seager Engine embodies every advanced feature of motor design and construction that has proven efficient in practical service. Dependable, durable and efficient. Guaranteed in every essential detail—a guarantee without a string to it. Write for full information.

WE MAKE CASTINGS

Automobile cylinders—clean, sound, accurate. Elaborate equipment for dry sand work. We have our own Chemical Laboratory and can furnish analysis on steels, cast irons, brasses, bronzes and babbitts on application.

We have full foundry equipment for brass work of every description—brasses and bronzes can be made to specification and held rigidly to analysis.

If you require castings, why not get the benefit of our splendid facilities? Let us quote you on your requirements—write, and we'll have a man on the ground at once.

SEAGER ENGINE WORKS

Formerly
Olds Gas Power Company

LANSING, MICHIGAN, U. S. A.

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

CHADWICK Engineering Works, Pottstown, Pa.

CHAMPAIGN Bros., 800 W. Buffalo St., Ithaca, N. Y.

CHESTER Engineering & Machine Co., Chester, Pa. (See page 293.)

CLAY & Co., E. H., 6950 Kinsman Rd., Cleveland, O.

CLIFTON Motor Works, 229-31 E. Clifton Ave., Cincinnati, O.

COLUMBIA Engine Co., Jefferson & Bellevue Aves., Detroit, Mich.

COMET Motor Works, 512 Monroe St., Chicago, Ill.

CONCRETE Form & Engine Co., Detroit, Mich. "Belle Isle."

CONSOLIDATED C. S. M. Co., 1047 Broad St., Bridgeport, Conn. "Bull Pup."

COOK Engine Co., Cambridge, Ill.

COOLEY Mfg. Co., Waterbury, Vt.

COWIE—See Schaake Machine Works.

CUSHMAN Motor Co., 2020 N St., Lincoln, Neb.

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis.

DEAN Mfg. Co., 262 Front St., Newport, Ky. "Fox."

DELAWARE Machine Works, Front & Orange Sts., Wilmington, Del. "Harris."

DEMOOY Bros., 1831-36 E. 55th St., Cleveland, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich. "Liberty."

DETROIT Engine Works, 1263 Jefferson Ave., Detroit, Mich.

DRAPER & Hall Co., Middletown, Conn.

DUNN, Walter E., Main St., Ogdensburg, N. Y.

EAGLE Co., 98 Warren St., Newark, N. J.

EDDYSTONE - GLOBE — See Pennsylvania Iron Works Co.

ELBRIDGE Engine Co., 22 Culver Rd., Rochester, N. Y.

EMERSON Engine Co., Prince & Fairfax Sts., Alexandria, Va.

EMERY, V. J., Wollaston, Mass. "Ideal."

ENTERPRISE Machine Co., 1114-22 S. Third St., Minneapolis, Minn. "Westman."

ERD Motor Co., Mackinaw St., Saginaw, Mich.

ESSEX Engine Co., 416 Union St., Lynn, Mass.

EVANSVILLE—See Mingst, C. P.

FAIRBANKS, Morse & Co., Wabash Ave. & Eldridge Pl., Chicago, Ill.

FAY & Bowen Engine Co., Geneva, N. Y.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O. (See pages 581-584.)

FIFIELD Bros. Co., 337 Water St., Augusta, Me. "Capital."

FISHBACK Mfg. Co., 714 N. Madison Ave., Peoria, Ill.

FISHERMAN—See Loan-Hiltz Engineering Co.

FOX—See Dean Mfg. Co.

FRISBIE Motor Co., 56 College St., Middletown, Conn.

FULTON Mfg. Co., Erie, Pa.

GAS Engine & Power Co. and Chas. L. Seabury Co. (Morris Heights), New York, N. Y. "Speedway."

GENERAL Machinery Co., 96 Trumbull St., Bay City, Mich. "Smalley."

GILE Boat & Engine Co., Ludington, Mich.

GLOBE—See Pennsylvania Iron Works Co.

GLOBE Iron Works Co., Menomonee, Wis.

GOLDEN-BELKNAP & Swartz Co., 1248 Grand River Ave., Detroit, Mich.

GORHAM Engineering Co., 2022 Chestnut St., Alameda, Cal.

GOSHEN Motor Works, Lincoln Ave. & Ninth St., Goshen, Ind.

GRAND Rapids Gas Engine & Yacht Co., 96 W. Front St., Grand Rapids, Mich.

GRASSER Motor Co., 100-04 Ottawa St., Toledo, O.

GRAY Motor Co., Lieb & Larned Sts., Detroit, Mich.

GRAY & Prior Machine Co., 32 Suffield St., Hartford, Conn. "Hartford."

GREEN Bay Machine Co., 1241-48 St. Clair St., Green Bay, Wis.

GRIMM Mfg. Co., 39 Erie St., Buffalo, N. Y.

HAASE Motor Works, 1017 Lloyd St., Milwaukee, Wis.

HACE Gas Engine Mfg. Co., Byesville, O.

HARRIS—See Delaware Machine Works.

HARTFORD—See Gray & Prior Machine Co.

HAZARD Motor Mfg. Co., Rochester, N. Y.

HEINEL Co., H. A., Monroe & Fifth Sts., Wilmington, Del.

HERR Engine Co., Portsmouth, O.

HERSCHELL-SPILLMAN Co., No. Tonawanda, N. Y. (See page 585.)

HOLLIDAY Engineering Co., 749 Bunker St., Chicago, Ill.

HOLMES Motor Co., West Mystic, Conn.

HUBBARD Motor Co., Middletown, Conn. "Victor."

HUMMING BIRD—See Alexander & Cox Co.

IDEAL—See Emery, V. J.

IMPERIAL Gas Engine Co., 60 Clementina St., San Francisco, Cal.

JAGER Co., Chas. J., 281-85 Franklin St., Boston, Mass.

JENCICK Motor Mfg. Co., 349 N. Main St., Port Chester, N. Y.

JOHNSON Bros. Co., Terre Haute, Ind.

JONES Co., S. M., 616 Segur Ave., Toledo, O. "Ralaco."

KAHLENBERG Bros. Co., Two Rivers, Wis.

KEIDEL & Co., Henry, 465 W. German St., Baltimore, Md. "Ardmore."

KENNEBEC—See Torrey Roller Bushing Works.

KNOX—See Camden Anchor-Rockland Machine Co.

LACKAWANNA Mfg. Co., 126 Liberty St., New York, N. Y.

LAMB Boat & Engine Co., Clinton, Iowa.

LEADER—See Sintz-Wallin Co.

LE JEAL Motor Works, 1721-23 Sassafras St., Erie, Pa.

LEIGHTON, H. J., 1017 W. Fayette St., Syracuse, N. Y.

LIBERTY—See Detroit Auto Specialty Co.

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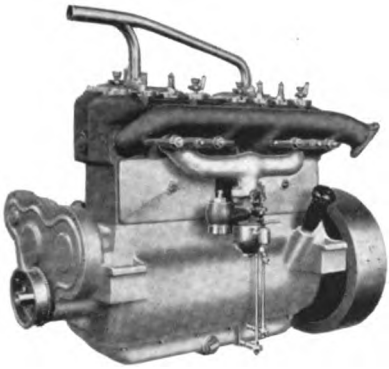

CONTINENTAL MOTORS
Eight Sizes—20 to 60 H. P.

To Automobile Manufacturers

Do you realize the importance of installing a reputable motor in your car? The advantage of *Continental* motors, which makes them superior to all others, is due to the fact that they run smoother, are longer lived, and need less adjusting.

We are now in position to supply motors to a greater number of car manufacturers than we had heretofore anticipated. If you have not placed you motor order for 1912 cars, we advise that you write us at once for prices, delivery dates, etc. If you have watched the wonderful performance of "CONTINENTAL" motors during the past years, there is no need of our telling you about their great efficiency and durability. Workmanship and material fully guaranteed.

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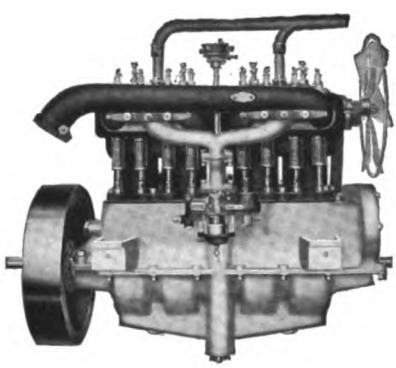

If you want to improve the power plant in your car without materially increasing the cost it will pay you to investigate the merits of the Parker Motor.

Knowing the merits and demerits of every stock motor on the market, we unhesitatingly state that the Parker Motor is the best for every purpose.

We can convince you of this fact if you will give it a trial. Write to-day or come to Hartford and let us demonstrate.

THE McCUE COMPANY, Hartford, Conn.

Exclusive Selling Agents

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

LILLIS, Thomas, Grassy Point, N. Y. "Uncle Sam."

LIPPERT, H., 2810 N. 11th St., St. Louis, Mo.

LITTLE SKIPPER—See Monarch Tool & Engine Co.

LOAN-HILTZ Engineering Co., Baltimore, Md. "Fisherman."

LOCKWOOD-ASH Motor Co., 210 W. Cortland St., Jackson, Mich.

LOEW Mfg. Co., 9100 Madison Ave., Cleveland, O.

MAFCO—See Rome Gasoline Engine Co.

MERCURY Motor Co., 390 Webster Ave., Long Island City, N. Y.

MIANUS Motor Works, Mianus, Conn.

MILLER Bros., 2331 N. Talman Ave., Chicago, Ill.

MILWAUKEE Motor Co., 32d & Burleigh Sts., Milwaukee, Wis.

MINGST, C. P., 1230 Riverside Ave., Evansville, Ind. "Evansville."

MODEL Gas Engine Works, Peru, Ind. (See page 577.)

MONARCH Tool & Mfg. Co., 120 Opera Pl., Cincinnati, O. "Little Skipper."

MURRAY & Tregurtha Co., 340 W. First St., (S. Boston), Boston, Mass.

NEW London Motor Co., Pequot Ave., New London, Conn. "Pequot."

NEW York Yacht, Launch & Engine Co. (Morris Heights), New York, N. Y. "20th Century."

NIAGARA Gasoline Motor Co., 174 Breckenridge St., Buffalo, N. Y. (See page 579.)

NORTHWESTERN Steel & Iron Works, Eau Claire, Wis.

NOYER-FOX—See Astoria Iron Works.

ONTARIO Iron Works, Maple Ave., Pulaski, N. Y.

ORIOLE—See Page Engineering Co.

ORMSBEE & Co., A. A., 35 Vernon St., Taunton, Mass. "Pearl."

OULTON Motor & Mfg. Co., 311 Atlantic Ave., Boston, Mass. (See page 451.)

PAGE Engineering Co., 113-21 E. York St., Baltimore, Md. "Oriole."

PALMER Bros., Cos Cob, Conn.

PEARL—See Ormsbee & Co.

PENNSYLVANIA Iron Works, Eddystone, Pa. "Eddystone-Globe," "Globe."

PEQUOT—See New London Motor Co.

PERFECTION—See Caille Perfection Motor Co.

PHILADELPHIA—See Central Machine Co.

PHILLIPS Gas Engine & Motor Works, Washington Blvd. & Clinton St., Chicago, Ill.

PIERCE-BUDD Co., 205-19 Saginaw St., Bay City, Mich.

PORTAGE Boat & Engine Co., Portage, Wis.

RALACO—See Jones Co.

RED Wing Motor Co., Red Wing, Minn.

REGAL Gasoline Engine Co., Coldwater, Mich.

REYNOLDS Motor Co., ft. Hilger Ave., Detroit, Mich.

RICE Bros. Co., E. Boothbay, Me. "Boothbay."

RICE Gas Engine Co., Bordentown, N. J.

ROBERTS Motor Co., 1339 Columbus Ave., Sandusky, O.

ROCHESTER Gas Engine Co., Platt St. & Browns Race, Rochester, N. Y.

ROME Gasoline Engine Co., Arsenal & Calvert Sts., Rome, N. Y. "Mafco."

ROYAL Engine Co., 1047 Broad St., Bridgeport, Conn.

RUTENBER—See Western Motor Co.

SAGAMORE Engine Co., 74-78 Sagamore St., Lynn, Mass.

SCHAAKE Machine Works, Seattle, Wash. "Cowie."

SCHAEFER Mfg. Co., Berlin, Wis.

SCRIPPS Motor Co., 651 Lincoln Ave., Detroit, Mich.

SHADEGG Engine Co., 313-17 Third St. S., Minneapolis, Minn.

SINTZ-WALLIN Co., W. Wheatley Ave., Grand Rapids, Mich. "Leader."

SMALLEY—See General Machinery Co.

SOPER—See Bucksport Launch & Engine Works.

SPAULDING Engine Co., St. Joseph, Mich.

SPEEDWAY—See Gas Engine & Power Co.

SPRINGFIELD Motor Co., 310 Grattan St., Chicopee Falls, Mass.

STANDARD Gas Engine Co., 10 California St., San Francisco, Cal.

STANLEY Co., 79 Milk St., Boston, Mass.

STERLING Engine Co., 1252-74 Niagara St., Buffalo, N. Y.

STRELINGER Marine Engine Co., 171-75 Woodbridge St., W., Detroit, Mich.

SYRACUSE Gas Engine Co., 1809 Park St., Syracuse, N. Y.

TAYLOR Engine Works, Norfolk, Va.

TEEL Mfg. Co., 132 Main St., Medford, Mass.

TEMPLE Pump Co., 15th St., Chicago, Ill.

TERMAAT & Monahan Co., River St., Oshkosh, Wis.

THELMA Engine Works, 258 Junction Ave., Detroit, Mich.

TIPPETT Mfg. Co , 172-82 W. Locust St., Columbus, O. (See page 579.)

TOLEDO—See Universal Machine Co.

TOPPAN Boat Mfg. Co., 25 Haverhill St., Boston, Mass.

TORREY Roller Bushing Works, Bath, Me. "Kennebec."

TREBERT, H. L. F., 407 St. Paul St., Rochester, N. Y.

TREBERT Gas Engine Co., Butler, Ind.

TRUSCOTT Boat Mfg. Co., St. Joseph, Mich.

TUTTLE Motor Co., Canastota, N. Y.

20TH CENTURY—See New York Yacht, Launch & Engine Co.

UNCLE SAM—See Lillis, Thos.

UNION Gas Engine Co., San Francisco, Cal.

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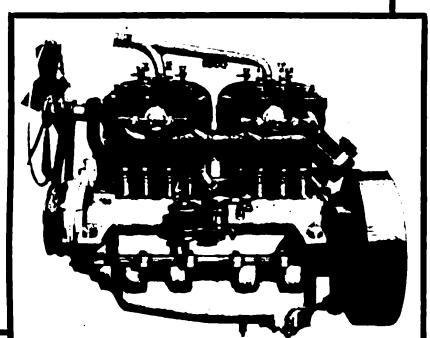
12 H.P. and 18 H.P.

"Beaver" Motors

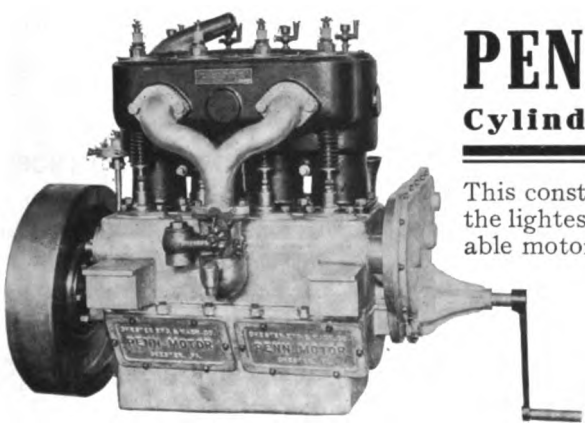
6 cylinder vertical $4\frac{3}{8}$ x $4\frac{3}{4}$.
4 cylinder vertical $4\frac{3}{8}$ x $4\frac{3}{4}$ and $4\frac{3}{4}$ x $5\frac{1}{4}$.
2 cylinder horizontal opposed $4\frac{3}{8}$ x 4 and $4\frac{3}{4}$ x 4 and $5\frac{1}{8}$ x $4\frac{1}{2}$.
4 cylinder horizontal opposed $5\frac{1}{8}$ x $4\frac{1}{2}$.
The 4 cylinder horizontal opposed motor is designed especially for commercial trucks.
Centre Crank Oiling device or Constant Level Splash System.
All motors 4 cycle.

Write for free booklet.

BEAVER MFG. CO.
789 Chase St., Milwaukee, Wis.



28-30 H.P. 35-40 H.P.



PENN MOTORS

Cylinders Cast En Bloc

This construction enables us to build the lightest, most compact and durable motor on the market.

Large Valve Areas and short lifts add to the power as well as the quiet running.

Crank-shafts of the suspended type.

Motors are equipped with a self-contained oiling system, and all parts are interchangeable and accessible.

TWO TYPES

Type A. 20 H.P. 4-cyl. $3\frac{1}{2}''$ bore, $4\frac{3}{4}''$ stroke.
Type AA. 30 H.P. 4-cyl. $4\frac{1}{4}''$ bore, $4\frac{3}{4}''$ stroke.

Manufactured by

CHESTER ENGINEERING & MACHINE COMPANY
Chester, Pa.

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MOTORS (Continued)

GASOLINE MARINE MOTORS (Continued)

UNIVERSAL Machine Co., Toledo, O. "Toledo."

VICTOR—See Hubbard Motor Co.

VALLEY Boat & Engine Co., 2700 River St., Saginaw, Mich.

VIM Motor Co., Water & Meige Sts., Sandusky, O.

WATERMAN Marine Motor Co., 1506-12 Fort St., W., Detroit, Mich.

WAUKESHA Motor Co., Waukesha, Wis. (See page 287.)

WECO—See Wright Engine Co.

WESTERN Motor Co., Marion, Ind. "Rutenber." (See page 295.)

WESTMAN—See Enterprise Machine Co.

WILLET Engine & Carbureter Co., 764 Ellicott Sq., Buffalo, N. Y.

WILPEN Co., 96-100 Bates St., Detroit, Mich.

WISCONSIN Machinery & Mfg. Co., Canal St. & Muskego Ave., Milwaukee, Wis.

WOLVERINE Motor Works, ft. Union Ave., Bridgeport, Conn.

WONDER Mfg. Co., 249 Tallman St., Syracuse, N. Y.

WRIGHT Engine Co., C. T., Greenville, Mich. "Weco."

GASOLINE MOTOR CYCLE MOTORS

AURORA Automatic Machinery Co., 1307 Michigan Ave., Chicago, Ill. "Thor."

THOR—See Aurora Automatic Machinery Co.

WAVERLY Mfg. Co., 1531 Wells St., Milwaukee, Wis.

KEROSENE MARINE MOTORS

AMERICAN Oil Engine Co., Danielson, Conn.

FAIRBANKS, Morse & Co., Wabash Ave. & Eldridge Pl., Chicago, Ill.

GRAND Rapids Gas Engine & Yacht Co., 96 W. Front St., Grand Rapids, Mich.

IMPERIAL Gas Engine Co., 60 Clementina St., San Francisco, Cal.

JAGER Co., Chas. J., 281-85 Franklin St., Boston, Mass.

LITTLE SKIPPER—See Monarch Tool & Mfg. Co.

MONARCH Tool & Mfg. Co., 120 Opera Pl., Cincinnati, O. "Little Skipper."

NICHOLS Power Co., Stamford, Conn.

REMINGTON Oil Engine Co., Stamford, Conn.

STRANG Engine Co., Harvey, Ill.

TERMAAT & Monahan Co., River St., Oshkosh, Wis.

WOLVERINE Motor Works, Bridgeport, Conn.

STEAM AUTOMOBILE MOTORS

(See Engines, Steam)

MOULDINGS

BRASS MOULDINGS

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

DRUEN, B. D., 71 Hamilton St., New Haven, Conn.

ENGLISH & Mersick Co., New Haven, Conn.

JONAH & George, Merrimac, Mass.

KINSEY Mfg. Co., Toledo, O. (See page 383.)

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

METAL Specialty Co., Cincinnati, O. (See page 625.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

NOVELTY Mfg. Co., Waterbury, Conn.

RANDOLPH-CLOWES Co., Waterbury, Conn.

SMITH & Co. Jos. N., Detroit, Mich. (See page 189.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

RUNNING BOARD MOULDINGS

(See also Mouldings, Brass; also Mouldings, Steel)

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

ENGLISH & Mersick Co., New Haven, Conn.

SMITH & Co., Jos. N., Detroit Mich. (See page 189.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

STEEL MOULDINGS

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y. (See page 775.)

MUFFLERS

EXHAUST MUFFLERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

ANTI-EXPLO—See Garage Equipment Mfg. Co.

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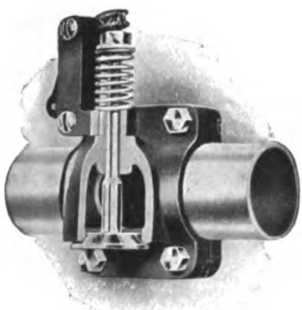
EJECTOR MUFFLERS

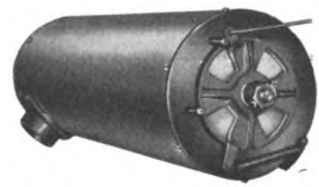
Built on a principle which practice has proven to be correct.
The only Muffler that uses suction to adjust itself to all speeds of the motor.

Made for all types of engines

Patented in the United States and Foreign Countries



Their use insures silent running, full power of engine, less heating, less cleaning of cylinders and plugs, less motor trouble. The Muffler that makes good our claim.



Motor & Mfg. Works Co., Geneva, N. Y.

New York, Oct. 20th, 1909

Dear Sirs:—I am now glad to be able to say that we have given the engine sufficient test to enable us to say that the Muffler is answering all my requirements and expectations and fully substantiates all your representations.

I congratulate you on your product and on your methods.

Consulting Engineer
149 Broadway, New York

Very truly yours,
(Signed) J. G. DUDLEY

IMPROVED CLAMP CUTOUT VALVES
Machined to fit the tube

Manufactured Exclusively by
MOTOR & MFG. WORKS CO., Geneva, N. Y.

RUTENBER MOTORS

STANDARD of the WORLD

Absolutely the highest class of workmanship enables us to place an unlimited guarantee on every Motor.

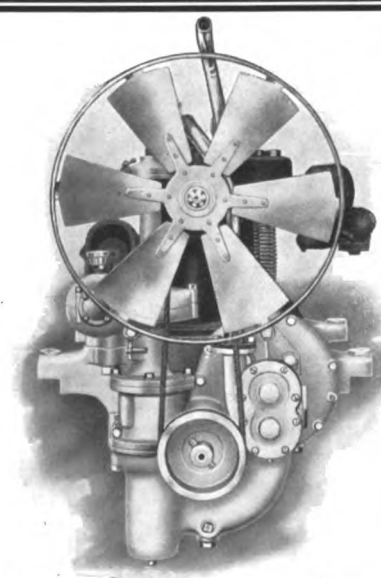
Rutenber construction embodies the best of American and Foreign practice.

Standard sizes 1911-1912
4 x 4—4½ x 5—4¾ x 5

Enclosed oiling system.

Supplied with or without magneto.

When writing for circulars state size, use and equipment.



The Western Motor Company
Marion and Logansport, Ind.
Sales Dept., Marion, Ind.

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MUFFLERS (Continued)

EXHAUST MUFFLERS (Continued)

ATLAS Stamping Co., 557-61 Jackson Blvd., Chicago, Ill.

AUTOMOBILE Supply Co., 547 W. 59th St., New York, N. Y.
(See page 673.)

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

BYRNE, Kingston & Co., 1040 Webster St., Kokomo, Ind. "Kingston."

DOMINION Stamping Co., Walkerville, Ont., Can.
(See page 221.)

EJECTOR—See Motor & Mfg. Works.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Anti-Explo."
(See page 283.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich.

GRUBB, Charles Edmund, 819 Fourth Ave., Altoona, Pa.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See pages 94 and 95.)

KELLS Mfg. Co., W. J., 726-28 11th Ave., New York, N. Y.
(See page 383.)

KINGSTON—See Byrne, Kingston & Co.

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 383.)

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., C. H. & D. Ry. & Wheatly St., Cincinnati, O.

LOOMIS Autocar Co., Westfield, Mass.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.
(See page 221.)

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium."
(See page 615.)

MOTOR & Mfg. Works Co., Geneva, N. Y. "Ejector."
(See page 295.)

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

OLDBERG Mfg. Co., Detroit, Mich.
(See page 315.)

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y.
(See page 297.)

RADIUM—See Milwaukee Auto Specialty Co.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SNOW Co., Benjamin W., 132 Bissell St., Syracuse, N. Y.
(See page 755.)

WEEBER Mfg. Works, C. F., Albany, N. Y.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

XARGIL Mfg. Co., 34 Broadway, Utica, N. Y.
(See page 297.)

YANKEE Co., Utica, N. Y.
(See page 297.)

MOTOR BOAT MUFFLERS

(See also Boxes, Underwater Exhaust)

HYDREX Silent Exhaust Works, 126 Liberty St., New York, N. Y.

THERMEX Silencer Works, 85 Sumner St., Boston, Mass.

THROAT MUFFLERS

BRADLEY Knitting Co., Delavan, Wis.

SCHAFER Muffler Co., 26-30 S. Jefferson St., Chicago, Ill.

SCOTT Knitting Co., 71 Gallia St., Portsmouth, O.

WAY Muffler Co., 23d & Arch Sts., Philadelphia, Pa.

NAILS

UPHOLSTERY NAILS

(See Tacks, Upholstery)

NIPPLES

PIPE NIPPLES

(See Fittings, Pipe)

PUMP NIPPLES

(See Connections, Tire Pump)

NUMBERS

LAMP NUMBERS

BALZER Co., Gus., 1777 Broadway, New York, N. Y.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

LICENSE NUMBERS OR HANGERS

(For License Holders—See Holders, License)

ALUMINUM Goods Mfg. Co., 701 Springfield Ave., Newark, N. J.

BALTIMORE Enamel & Novelty Co., foot of Allen St., Baltimore, Md.

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I.
(See page 625.)

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

CASSADAY-FAIRBANK Mfg. Co., 6106-30 LaSalle St., Chicago, Ill.

CHILDS & Co., S. D., 279 E. Monroe St., Chicago, Ill.

EMPIRE Dash & Fender Mfg. Co., 247-49 W. 47th St., New York, N. Y.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

GREACEN & Co., Walter, 12 Mechanic St., Newark, N. J.

Complete Index to Classification appears on Pages 8 to 22.

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LIGHT WEIGHT SILENCE SUCTION

The Muffler with a Guarantee

XARGIL VACUUM MUFFLER

Many Muffler Manufacturers make extravagant claims as to silence and back pressure. On trial you find that the muffler does not fulfil the claims made for it but *they have your money* and you have no recourse except to grin and bear it. *We know* that our muffler will do all that we claim for it and every muffler retailed is sold under the following broad GUARANTEE

We guarantee all goods sold by us to be exactly as represented and of good workmanship and material, and *if in five days after receipt of muffler the purchaser finds the muffler unsatisfactory in any way, he may return the muffler to us and receive his money back, less the forwarding and return charges.*

Write us for descriptive booklet and prices.

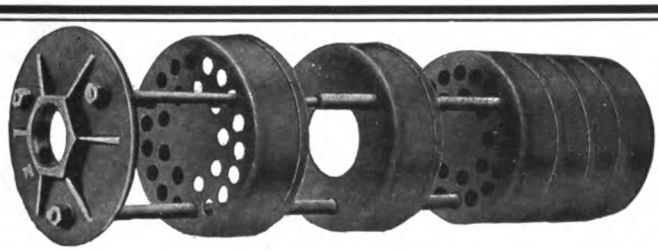
XARGIL MANUFACTURING CO., 34 Broadway, Utica, N. Y.

THE "YANKEE" SILENT MUFFLER

The "Yankee" Silent Muffler, known the world over, is made different from all other mufflers. No complicated parts to become clogged or get out of order. Over 200,000 in use on automobiles and marine engines. No back-pressure, and silent. Made of steel which makes it light. The expansion chamber draws the burnt gases from engine and prevents heating. Made in various sizes, from 1 to 100 H. P. Sample sent on approval. Write for free catalog

THE YANKEE COMPANY UTICA, N. Y., U. S. A.

Powell Pressed Steel Muffler



WE manufacture Mufflers of the following diameters: 5 inch, 6 inch and 6¾ inch and we use the number of sections necessary to properly muffle the different size motors that are on the market.

5 inch diameter Mufflers are stamped from 20 gauge steel
6 " " " " " " 18 " "
6¾ " " " " " " 16 or 18 gauge steel.

This muffler is made up of a succession of pressed steel cups drawn from sheet metal. Each cup is shouldered so that it overlaps the bottom of the succeeding one by one-fourth of an inch.

The end plates are malleable iron, with pipe or flange connection.

The perforations are around the outer edge of each baffling plate with an additional one in the center of the first few, the area of these holes varying with the size of the engine to be muffled.

The POWELL MUFFLER is *standard equipment on 36 of the best AMERICAN made automobiles and trucks*, which is ample proof of its efficiency and durability.

Powell Muffler & Timer Co.

42 La Fayette Street Utica, N. Y.

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NUMBERS (Continued)

LICENSE NUMBERS OR HANGERS (Continued)

INGRAM-RICHARDSON Mfg. Co., Beaver Falls, Pa.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

MOORE & Steinford, 2317 State St., Chicago, Ill. (See page 441.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MULHAUPT, F. Jos., 227 N. Fifth St., LaFayette, Ind.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NIAGARA Falls Metal Stamping Works, Niagara Falls, N. Y.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

ROYAL Enameling & Stamping Works, Desplaines, Ill.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

STILLMAN, A. P., 124 Chambers St., New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

NUTS

CASTELLATED NUTS

CLARK Bros. Bolt Co., Milldale, Conn. (See page 367.)

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

GRAHAM Nut Co., Pittsburg, Pa.

MILTON Mfg. Co., Milton, Pa. (See page 299.)

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 365.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., Elyria, O. (See page 365.)

FINISHED AND CASE HARDENED NUTS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

ANTHONY Screw Co., 330 Chandler St., Worcester, Mass.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

CHICAGO Screw Co., 1026 Homan Ave., Chicago, Ill.

CINCINNATI Screw & Tap Co., Twightwee, O.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 367.)

GRAHAM Nut Co., Pittsburg, Pa.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 737.)

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

MILTON Mfg. Co., Milton, Pa. (See page 299.)

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 365.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

NEW Haven Machine Screw Co., 195 Saltonstall Ave., New Haven, Conn.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PITTSBURG Mfg. Co., 28th St. & A. V. R. R., Pittsburg, Pa.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

RUSSELL-BURDSALL & Ward Bolt & Nut Co., Port Chester, N. Y.

WESTERN Automatic Machine Screw Co., Elyria, O. (See page 365.)

LOCK NUTS AND WASHERS

(For Standard Nuts—See Bolts, Machine)

AMERICAN Lock-Nut Co., 319 Franklin St., Chicago, Ill.

CINCINNATI Screw & Tap Co., 2442 Beekman St., Cincinnati, O.

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn.

DRAVER Bros., Richmond, Ind.

EUREKA Nut Lock Co., 32nd & Smallman Sts., Pittsburg, Pa.

FASTNUT—See Hoffnung & Co.

GRIP Nut Co., Old Colony Bldg., Chicago, Ill.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

HOBBS Mfg. Co., Worcester Mass.

HOFFNUNG & Co., S., 116 Broad St., New York, N. Y. (Importers.) "Fastnut."

NATIONAL Lock Washer Co., Newark, N. J.

POSITIVE Lock Washer Co., Newark, N. J. (See page 633.)

RELIANCE Mfg. Co., Massillon, O. (See page 633.)

U. S. Lock Washer Co., 34-36 Brenner St., Newark, N. J. (See page 633.)

VICTOR—See Walker Bros. Co.

WALKER Bros. Co., 216 Walton St., Syracuse, N. Y. "Victor."

WEISELL Nut-Lock Co., 1500 Republic Bldg., Chicago, Ill.

THUMB OR WING NUTS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

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"MILTON"

A.L.A.M.

NUTS

We are specialists in Nut making. As specialists our whole energies are devoted to the making of a distinctly high-grade product.

Our A. L. A. M. Nuts are being specified exclusively by many large manufacturers of Automobiles, and we are strong in the faith that once you have used them, their Efficiency will establish you as a regular customer with us as well.

Write us for price and deliveries.

The Milton Mfg. Company

Milton, Pennsylvania

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NUTS (Continued)

THUMB OR WING NUTS (Continued)

CINCINNATI Screw & Tap Co., Twightwee, O.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 367.)

COLUMBUS Bolt Works, Columbus, O.

CORBIN Screw Corp., New Britain, Conn. (See page 243.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DETROIT Screw Works, Detroit, Mich. (See page 739.)

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KEYSTONE Drop Forge Works, Chester, Pa.

MICHIGAN Bolt & Nut Works, foot Meldrum Ave., Detroit, Mich.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

ST. Louis Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., Elyria, O. (See page 365.)

WHITMAN & Barnes Mfg. Co., Akron, O.

OAKUM

BALTIMORE Oakum Co., Baltimore, Md.

DAVEY & Sons, W. O., Jersey City, N. J.

JACOBS-MILLER Co., 18 E. Fourth St., Cincinnati, O.

OVERMAN & Schrader Cordage Co., Covington, Ky.

STRATFORD Oakum Co., Geo., Jersey City, N. J.

TIBBATS Oakum Co., Cobalt, Conn.

WHITLOCK Cordage Co., 46 South St., New York, N. Y.

OARS

OARS AND PADDLES

DETROIT River Boat & Oar Co., ft. Eureka Ave., Wyandotte, Mich.

DUNPHY Boat Mfg. Co., Eau Claire, Wis.

EZEKIEL—See New York Boat Oar Co.

KIDNEY & Son, Dan, West De Pere, Wis.

NEW York Boat Oar Co., 69 West St., New York, N. Y. "Ezekiel."

PETOSKEY Boat Co., 115 Midway, Petoskey, Mich.

RUSHTON, J. H., 671 Water St., Canton, N. Y.

OILS

LUBRICATING OILS

ACHESON Oildag Co., Port Huron, Mich. "Oildag." (See page 217.)

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

ALBANY Lubricating Co., 313 West St., New York, N. Y.

ALEXANDER & Co., H. T., 17 Battery Pl., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Amoilco." (See page 219.)

AMOCO—See American Oil Co.

AMOILCO—See American Oil Co.

ANTICARBO—See Cincinnati Oil Works Co.

ARCO—See Atlantic Refining Co.

ATLANTIC Refining Co., 2 Wise Bldg., Cleveland, O. "Arco." (See page 285.)

ATLAS—See Swan & Finch Co.

AURORA—See Pigot-Sayre Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTOBY—See Great Western Oil Co.

AUTOLEUM—See Chesterton & Co.

AUTOLINE—See Robinson & Son Co.

BANNER—See Clarkson & Ford Co.

BANNER—See Cortland Specialty Co.

BARTLES-MAGUIRE Oil Co., 417 Chamber of Commerce, Milwaukee, Wis. "Northland."

BAUM'S Castorine Co., Rome, N. Y.

BELDEN & Co., A. G., 145 Maiden Lane, New York, N. Y.

BELL Oil Co., 51 Ferry St., St. Louis, Mo. "Liberty Bell."

BLIVEN & Carrington, 115 Broad St., New York, N. Y. "Champion."

BORNE-SCRYMSER Co., 80 South St., New York, N. Y. "Colonial." (See page 303.)

BUCK & Co., E. A., Worcester, Mass.

BULLY—See New York Oil & Paint Co.

CASCADE—See Cataract Refining & Mfg. Co.

CATARACT Refining & Mfg. Co., Buffalo, N. Y. "Cascade."

CENTURY—See Davey & Co.

CHAMPION—See Bliven & Carrington.

CHAMPION Oil Co., 39th St. & Lowe Ave., Chicago, Ill.

CHESTERTON & Co., A. W., 64 India St., Boston, Mass. "Autoleum."

CHILDS Co., G. B., 499 Greenwich St., New York, N. Y.

CINCINNATI Oil Works Co., 323 Sycamore St., Cincinnati, O. "Anticarbo."

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

CLINTON Oil Co., Cleveland, O. "Red Star."

Complete Index to Classification appears on Pages 8 to 22.

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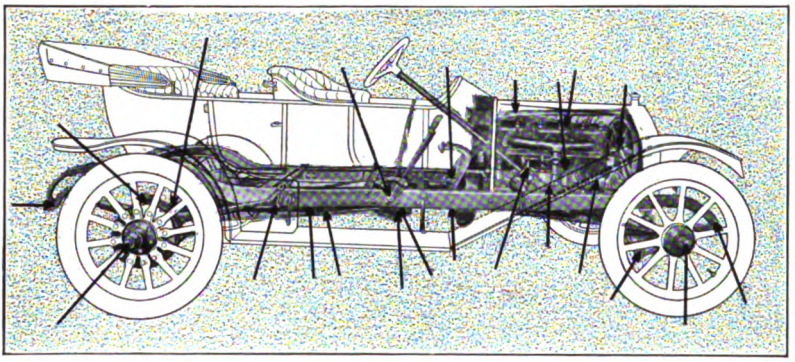

This illustration indicates the location of the oiling points of a motor car (the number and location of these points vary in different types of cars). Unless properly lubricated with suitable oil and grease, an automobile will give trouble and soon wear out.

The Importance of Lubrication

PROPER lubrication is of vital importance to the successful operation of a motor car. Manufacturers and dealers realize this. A large number of those owning or operating automobiles do not, and as a result over 65 per cent of automobile troubles are due to insufficient lubrication or to the use of unsuitable lubricants. Automobile lubrication has been studied exhaustively by the experts of this Company. As the result of these studies and the experience gained during years of extensive manufacturing of oils for every use, the Standard Oil Company has put on the market the most efficient automobile lubricants yet produced. These are sold under the name

Polarine

The **Polarine** Brand covers Oil, Transmission Lubricants and Greases. These **Polarine** Lubricants have been produced by our experts after thousands of laboratory and practical tests. We believe that they are the best automobile lubricants on the market.

Polarine Oil is an oil rich in lubricating quality. Feeds perfectly at any temperature down to zero. Gives freedom from destructive carbon deposits. Lengthens the life of cylinders, piston rings and bearings. **Polarine** Transmission Lubricants and **Polarine** Greases have been specially manufactured for the parts of the car requiring lubricants of a heavy consistency. These products are unequalled for the lubrication of the special parts for which they are recommended.

Use **Polarine** Lubricants this season. They will add to the pleasure of motoring. They will enable you to save repair bills, increase your speed, climb hills easier and do away with the many petty mishaps due to the use of unsuitable lubricants.

All dealers sell **Polarine** Lubricants or can get them for you.

Our Booklet, **Polarine Pointers,** contains facts about the care of motor cars, including hints on lubrication and the causes of engine troubles. If you own a motor car or motor boat send for this booklet. Write our nearest agency.

Standard Oil Company

(INCORPORATED)

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Dealers Can Recommend These Products with Confidence

Polarine Oil (frost and carbon proof) furnishes perfect lubrication for all types of gasoline engines and for all wearing parts. It is delivered in sealed cans—gallon and five-gallon sizes—or in barrels and half-barrels.

Polarine Transmission Lubricants are prepared in three consistencies. "A," for Summer and Winter use on transmissions where conditions permit a *semi-fluid* oil. "B," for Summer and Winter use, on transmissions and differentials where a *semi-solid* lubricant is required. "BB," especially recommended for *Summer use* on transmissions and differentials. The cans are of convenient size.

Polarine Cup Grease is a solid lubricant for use in cups and where a heavier grade than "BB" is desired.

Polarine Fibre Grease is a solid lubricant of high melting point, particularly adapted for use on universal joints. Delivered in round cans.

Send to our nearest Agency for Booklet

Standard Oil Company

(INCORPORATED)

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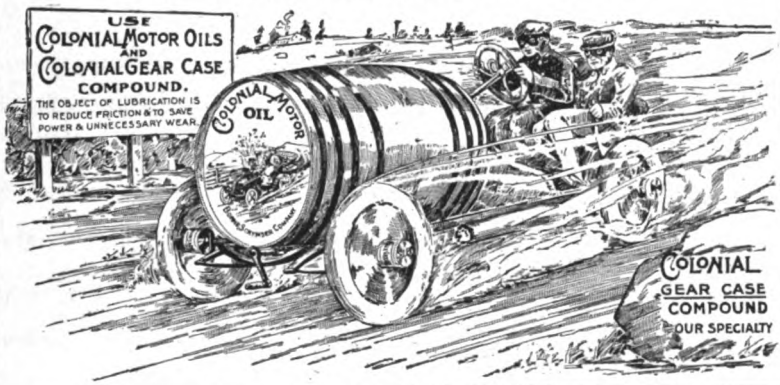
TO OBTAIN THE BEST RESULTS, USE THE BEST LUBRICANTS.
CAN BE HAD AT GARAGES, OR AT ANY OF OUR STORES



COLONIAL MOTOR OIL

COLONIAL GEAR CASE COMPOUND
AND
SILEX GREASE

FOR MOTOR CARS AND
MOTOR BOATS

Borne, Scrymser Company
80 South Street, New York

BOSTON
Central Wharf

PHILADELPHIA
216 North Front Street

FALL RIVER, MASS.
160 Third Street

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OILS

LUBRICATING OILS (Continued)

COLONIAL—See Borne-Scrymser Co.

COLUMBIA Lubricants Co., of New York, 116 Broad St., New York, N. Y. "Monogram."

COMMODORE—See Miller Co., Wm. P.

CONNECTICUT Oil Co., Waterbury, Conn.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

CRANE & Co., L. M., 91 Oliver St., Boston, Mass. "Eureka."

CRAWFORD Co., Wm. J., 14 Wood St., Pittsburg, Pa.

CRESCENT Oil Co., 602 W. Pratt St., Baltimore, Md.

CREW-LEVICK Co., Land Title Bldg., Philadelphia, Pa.

CROWN—See Great Western Oil Co.

CURRY Bros. Oil Co., 284 Franklin St., Boston, Mass. "Superba."

DAVEY & Co., 2608 Grand Ave., Chicago, Ill. "Century."

DEARBORN Drug & Chemical Works, Chicago, Ill. "Fort Putnam," "Fort Auto," "Fort Hudson."

DEFIANCE—See Waverly Oil Works Co.

DIAMOND CROSS—See Auto Oil Co.

DUPLEX—See Enterprise Oil & Supply Co.

EAGLE Oil & Supply Co., Boston, Mass. "No-Karbon." "Eagleine." (See page 217.)

EAGLEINE—See Eagle Oil & Supply Co.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

ENTERPRISE Oil & Supply Co., Buffalo, N. Y. "Duplex."

EUREKA—See Crane & Co.

EXCELSIOR—See Miller's Sons.

FAULTLESS—See Hawkeye Oil Co.

FIAT—See Pennsylvania Oil Works Co.

FIDELITY Oil Co., 600-02 W. Fifth St., Kansas City, Mo.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Lubroleine."

FORT AUTO—See Dearborn Drug & Chemical Co.

FORT HUDSON—See Dearborn Drug & Chemical Co.

FORT PUTNAM—See Dearborn Drug & Chemical Co.

FRANK Oil Co., Titusville, Pa.

FULCRUM Oil Co., Franklin, Pa.

G. L.—See General Lubricating Oil Co.

GENERAL Lubricating Oil Co., 1777 Broadway, New York, N. Y. "G. L." (See page 219.)

GENERAL Oil Works Co., 614 Traction Bldg., Indianapolis, Ind. "Reliable."

GEOGHAN & Son, A., 207 Newell St., Brooklyn, N. Y. "Great Arrow." (See page 461.)

GOSSLER Oil Co., Allentown, Pa.

GRAND PRIX—See Alexander & Co.

GREAT ARROW—See Geoghan & Son.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "Autoby," "Nokarbo," "Crown."

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Packard 24-30."

GREOIL—See Robinson & Son Co.

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. (See page 307.)

HARRIS & Co., Elmer E., 2 Maurice St., Buffalo, N. Y.

HAVOLINE—See Indian Refining Co.

HAVOLINE Oil Co., 133 William St., New York, N. Y. (See page 217.)

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, George A., 62 Pine St., New York, N. Y. "Panhard." (See page 305.)

HOFFMEISTER Co., Leo, 396-98 Clinton St., Milwaukee, Wis.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

IDEAL—See Sawyer Oil Co.

IDEAL—See Sheppard, W. S.

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y.

INDIAN Refining Co., Cincinnati, O. "Havoline."

INVADER—See Kellom & Co.

INVINCIBLE—See Miller's Sons Co.

KAUFMAN Oil & Grease Co., L., Pittsburg, Pa. "Keystone."

KELLOGG & Co., E. H., 233-43 South St., New York, N. Y.

KELLOM & Co., Chas. F., 113 Arch St., Philadelphia, Pa. "Invader."

KENDALL Refining Co., Bradford, Pa. (See page 387.)

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KEYSTONE—See Kaufman Oil & Grease Co.

KEYSTONE Lubricating Co., 21st & Clearfield Sts., Philadelphia, Pa.

KEYSTONE Refining Co., Columbus, O.

KINCAID Oil Co., 219-21 W. Exchange St., Providence, R. I.

KOSMOS—See Mulliken Oil Co.

LIBERTY—See Richardson Lubricating Co.

LIBERTY BELL—See Bell Oil Co.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa. "Paragon."

LUBROLEINE—See Fiske Bros. Refining Co.

M-C—See Mound City Oil & Supply Co.

McLEAN-JONES Oil & Supply Co., 65 Long Wharf, Boston, Mass. "Swastika."

MAGIE Bros., 155-57 N. Canal St., Chicago, Ill. "Russian."

MANHATTAN Oil Co., 51 Front St., New York, N. Y.

MARSHALL Oil Co., Marshalltown, Iowa.

MERCEDES—See Sweet, Charles F.

MERIT—See Oil City Oil & Grease Co.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

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PANHARD OIL

The dealer who handles Panhard Oil has the satisfaction of winning permanent customers, of seeing his oil sales increase from month to month.

Panhard Oil pleases every user because it combines heavy body with freedom from carbon. It is refined with such care that the free tarry matter is extracted without reducing lubricating properties.

Our latest booklet will give many valuable hints on lubricating. Write for it now, and ask for our special proposition to the trade.

62 Pine St. GEORGE A. HAWS New York

EXCELSIOR FIBEROUS OIL

A new lubricant especially adapted to meet the requirements of automobile gears of every description. Not a cup or sponge grease, thinned down with oil, as is the case with most lubricants. Does not lose body under the most severe use; will never pack away from gears, and assures an even distribution over all friction surfaces.

WM. P. MILLER'S SONS

Twelfth Street, Long Island City, New York

Manufacturers also of

PAN-O-LITE CYLINDER OIL

This oil is entirely free from carbon producing impurities, yet of high viscosity. Is highly filtered, regardless of cost, and is refined from the best grade Pennsylvania Crude. Has a fire test which long experience has proven most satisfactory.

AN OIL THAT GIVES ALL-AROUND SATISFACTION

PAN-O-LITE

CYLINDER -OIL-

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OILS (Continued)

LUBRICATING OILS (Continued)

MILLER Co., Wm. P., 244-50 Greene St., Brooklyn, N. Y. "Commodore."

MILLER'S Sons, Wm. P., 12th St., Long Island City, N. Y. "Excelsior." "Pan-O-Lite."
(See page 305.)

MILLERS Sons Co., A. D., Pittsburg, Pa. "Invincible."

MOBILOIL—See Vacuum Oil Co.

MONARCH Mfg. Co., Council Bluffs, Iowa.

MONOGRAM—See Columbia Lubricants Co.

MOTORLUBE—See Tygert Co.

MOTOROL—See New York & New Jersey Lubricant Co.

MOUND City Oil & Supply Co., 202 N. Commercial St., St. Louis, Mo. "M-C."

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

MUSCATINE Auto & Oil Co., 106 Iowa Ave., Muscatine, Iowa.

NATIONAL Oil Supply Co., Essex & First Sts., Harrison, N. J. "Viscos."

NATIONAL Refining Co., 1063 Rose Bldg., Cleveland, O. "Visco."

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y. "Bully."

NEW York & New Jersey Lubricant Co., 165 Broadway, New York, N. Y. "Motorol."

NO-KARBON—See Eagle Oil & Supply Co.

NOKARBO—See Great Western Oil Co.

NORTHLAND—See Bartles-Maguire Oil Co.

NORTHROP Lubricating Oil Co., 308 N. Commercial St., St. Louis, Mo.

NYE, Wm. F., New Bedford, Mass.

OIL City Oil & Grease Co., Oil City Trust Bldg., Oil City, Pa. "Merit."

OILDAG—See Acheson Oildag Co.

OILZUM—See White & Bagley Co.

ORIENTAL Oil Co., San Antonio, Tex.

OZARK—See Tropical Oil Co.

PACKARD 24-30—See Greenslade Oil Co.

PACKARD—See Wolverine Lubricants Co.

PANHARD—See Haws, Geo. A.

PAN-O-LITE—See Miller's Sons.

PARAGON—See Loos & Dilworth.

PARAGON REFINING Co., Front St., Toledo, O. "Petrolene."

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PENN Oil & Supply Co., 1110-20 N. Branch St., Chicago, Ill.

PENNSYLVANIA Oil Works Co., 72 Front St., New York, N. Y. "Fiat," "Zenith."

PERFECTION—See Wood Co.

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLENE—See Paragon Refining Co.

PETROLEUM Products Co., 3600 Grant Blvd., Pittsburg, Pa. "Sound-Proof."
(See page 219.)

PIERCE & Rice Oil Co., Hammond & Canterbury Sts., Worcester, Mass.

PIGOT-Sayre Co., 135 William St., New York, N. Y. "Aurora."

POLARINE—See Standard Oil Co.

RED STAR—See Clinton Oil Co.

RELIABLE—See General Oil Works Co.

RICHARDSON Lubricating Co., Quincy, Ill. "Liberty."

RIGHTOIL—See Stanley Oil Co.

ROBINSON & Son Co., Wm. C., 1501-07 Thames St., Baltimore, Md. "Autoline," "Greoil."

RUSSIAN—See Magie Bros.

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Ideal."

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "Ideal."

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 367 Atlantic Ave., Boston, Mass.

STANDARD Oil Co., 26 Broadway, New York, N. Y. "Polarine."
(See back cover.)

STANLEY Oil Co., 551 W. 42d St., New York, N. Y. "Rightoil."

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

SUPERBA—See Curry Bros. Oil Co.

SUPERIOR Oil Co., Wade Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

SWASTIKA—See McLean-Jones Oil & Supply Co.

SWEET, Charles F., 20 Ford St., Hartford, Conn. "Mercedes."

TEXACO—See Texas Oil Co.

TEXAS Co., New York, N. Y. "Texas."
(See page 199.)

THREE In One Oil Co., 8 Broadway, New York, N. Y.

TIONA Refining Co., Indianapolis, Ind.

TROPICAL Oil Co., W., 70th St. & L. S. & M. C. Ry., Cleveland, O. "Ozark."

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

UNDERHAY Oil Co., 276 Franklin St., Boston, Mass.

VACUUM Oil Co., Rochester, N. Y. "Mobiloil."
(See pages 301 and 302.)

VALVOLINE Oil Co., 11 Broadway, New York, N. Y.

VELVET—See Sutherland & Co.

VISCO—See National Refining Co.

VISCOLINE—See Zartman Oil Co.

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 1063 W. 37th St., Chicago, Ill.

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa. "Defiance."

WHALE—See Nye, Wm. F.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Oilzum."

WHIZOIL—See Hollingshead Co.

WILBURINE Oil Works, 11 Broadway, New York, N. Y.

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OILS (Continued)

LUBRICATING OILS (Continued)

WOLVERINE Lubricants Co., 80 Broad St., New York, N. Y. "Packard." (See page 309.)

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection."

YOUKIM—See Young & Kimball.

YOUNG, Orlando W., 180 Freylinghuysen Ave., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Youkim."

ZARTMAN Oil Co., J. V., 120 S. Meridian St., Indianapolis, Ind. "Viscoline."

ZENITH—See Pennsylvania Oil Works Co.

ORNAMENTS

RADIATOR ORNAMENTS

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BILLIKEN Co., 290 Fifth Ave., Chicago, Ill.

CRAMP & Sons Ship & Engine Building Co., Wm., Philadelphia, Pa. (See page 281.)

GOODWIN & Kintz Co., Winsted, Conn.

HUNTZ & Henderson, 915 Boylston St., Boston, Mass.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

PACKING

ASBESTOS AND FIBROUS PACKING

AMERICAN Asbestos Co., Stanbridge & Steirgere Sts., Norristown, Pa. "Motorbestos."

CAREY Co., Phillip (Lockland), Cincinnati, O.

CRANDALL Packing Co., Palmyra, N. Y.

EAGLE Oil & Supply Co., Boston, Mass. (See page 217.)

EUREKA Packing Co., 78-80 Murray St., New York, N. Y.

GARLOCK Packing Co., Palmyra, N. Y.

HART Packing Co., Boston, Mass.

J. M. MOBILENE—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J. M. Mobilene."

KEASBEY & Mattison Co., Ambler, Pa.

MORGAN & Wright, Detroit, Mich.

MOTOBESTOS—See Woven Steel Hose & Rubber Co.

MOTORBESTOS—See American Asbestos Co.

NEW Jersey Asbestos Co., 11th & Linden Sts., Camden, N. J.

PEARSON & Co., J. H., 122 Centre St., New York, N. Y. "Vellumoid."

SALL Mountain Asbestos Mfg. Co., 230 S. La Salle St., Chicago, Ill.

VELLUMOID—See Pearson & Co.

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Motobestos." (See page 651.)

METALLIC PACKING

(See Gaskets, Metallic)

RUBBER PACKING

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CANFIELD Mfg. Co., Lehigh Ave. & Howard St., Philadelphia, Pa.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.

CONSOLIDATED Rubber Co., Trenton, N. J.

CRANDALL Packing Co., Palmyra, N. Y.

CRESCENT Belting & Packing Co., Trenton, N. J.

EAGLE Oil & Supply Co., Boston, Mass. (See page 217.)

EMPIRE Rubber Mfg. Co., Trenton, N. J.

EUREKA Packing Co., 78-80 Murray St., New York, N. Y.

GARLOCK Packing Co., Palmyra, N. Y.

GOODSELL Packing Co., 117 N. Canal St., Chicago, Ill.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HART Packing Co., Boston, Mass.

HOME Tire Co., Trenton, N. J. (See page 385.)

KNOWLTON Rubber Co. Geo. W., 60 Pearl St., Boston, Mass.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MORGAN & Wright, Detroit, Mich.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

REVERE Rubber Co., 77 Bedford St., Boston, Mass.

STOKES Rubber Co., Jos., Trenton, N. J.

THERMOID Rubber Co., Trenton, N. J. "Vulcanoid." (See page 609.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

VULCANOID—See Thermoid Rubber Co.

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PADS

LICENSE PADS

(See Numbers, License)

PAINTS

PAINTS AND COLORS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

BESCO—See Buffalo Enamel Stain Co.

BILLINGS-CHAPIN Co., Cleveland, O.

BOSTON Varnish Co., Everett, Mass.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

BUFFALO Enamel Stain Co., Buffalo, N. Y. "Besco."
(See page 727.)

BUFFALO Oil Paint & Varnish Co., Buffalo, N. Y.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E. Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DITZLER Color Co., 18 W. Baltimore Ave., Detroit, Mich.

FELTON, Sibley & Co., 136-140 No. 4th St., Philadelphia, Pa.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

HARRISON Bros. & Co., 35th St. & Grays Ferry Rd., Philadelphia, Pa.

HEATH & Milligan Mfg. Co., 170-72 Randolph St., Chicago, Ill.

HIGH STANDARD—See Lowe Bros. Co.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOFFMAN Paint & Varnish Co., 8 Medford St., Boston, Mass.

JOHNSTON Paint Co., 226 Main St., Cincinnati, O.

KEENE-PEASLEE Co., Amesbury, Mass.

KEYSTONE Paint & Filler Co., Munsey, Pa.

KING—See Chicago White Lead & Oil Co.

LOWE Bros. Co., Dayton, O. "High Standard."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.
(See page 453.)

MOSER Co., Chas., Cincinnati, O.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NICE, Eugene E., 272-74 S. Second St., Philadelphia, Pa.

PATTERSON-SARGENT Co., Prospect & Huron Sts., Cleveland, O.

PIERCE Co., F. O., 12 W. Broadway, New York, N. Y.

ST. Louis Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo.

SCHRACK & Co., C., 152 No. 4th St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, Sixth St. & West Ave., L. I. City, N. Y.

UHLICH & Co., Paul, 11 Cliff St., New York, N. Y. (Importers) (Colors only).

VALENTINE & Co., 257 Broadway, New York, N. Y.

VESTAL Paint Co., Vestal, N. Y.

WADSWORTH, Howland & Co., Boston, Mass.

WILHELM Co., A., Reading, Pa.

WILLEY Co., C. A. (Hunter's Point), New York, N. Y.
(See page 311.)

ALUMINUM AND BRONZE PAINTS

BILLINGS-CHAPIN Co., Cleveland, O.

BINSWANGER & Co., B., 115 N. Fourth St., Philadelphia, Pa.

BRONZE Powder Works Co., Elizabeth, N. J. "Ideal," "Vulcan."

CULLEN & Co., F. C., First National Bank Bldg., Chicago, Ill.

GERSTENDORFER Bros., 231 E. 42d St., New York, N. Y.

IDEAL—See Bronze Powder Works Co.

KEMP Co., W. H., 165 Spring St., New York, N. Y.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

VULCAN—See Bronze Powder Works Co.

ENAMEL PAINTS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill.

AKRON Varnish Co., Akron, O. "Peerless."

ALUMINO—See Hazen-Brown Co.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill.

BESCO—See Buffalo Enamel Stain Co.

BUFFALO Enamel Stain Co., Buffalo, N. Y. "Besco."
(See page 727.)

DETROIT White Lead Works, 530-60 Milwaukee Ave., E. Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

FELTON, Sibley & Co., 136-140 North Fourth St., Philadelphia, Pa.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

HAZEN-BROWN Co., 101 South St., Boston, Mass. "Alumino."

HEPCO—See Holland Enamel & Paint Co.

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PAINTS (Continued)

ENAMEL PAINTS (Continued)

HOLLAND Enamel & Paint Co., 142 Fulton St., New York, N. Y. "Hepco."

MASURY & Son, John W., New York, N. Y.
(See page 453.)

MOLLER & Schumann Co., New York, N. Y.
(See page 311.)

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

PEERLESS—See Akron Varnish Co.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

STANDARD Varnish Works, 29 Broadway, New York, N. Y.

VALENTINE & Co., 257 Broadway, New York, N. Y.

EXHAUST PIPE AND MUFFLER PAINTS

AMERICAN Paint Mfg. Co., Mattapan, Mass. "Ampamaco."

AMPAMACO—See American Paint Mfg. Co.

BULGER Varnish Co., William, 105th St. & Quebec Ave., Cleveland, O.

C. O. T.—See Tingley & Co.

TINGLEY & Co., Chas. O., Rahway, N. J. "C. O. T."

MOTOR BOAT PAINTS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

BALTIMORE Copper Paint Co., Baltimore, Md.

BILLINGS-CHAPIN Co., Cleveland, O.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "Eksel."

CROCKETT Co., David B., Bridgeport, Conn.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

EKSEL—See Chicago White Lead & Oil Co.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GARDINER & Sons, Geo. N., New York, N. Y.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

HARRISON Bros. & Co., 35th St. & Grays Ferry Rd., Philadelphia, Pa.

HEATH & Milligan Mfg. Co., 170-72 Randolph St., Chicago, Ill.

HENDERSON & Johnson, Gloucester, Mass.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

KUHLS, H. B. Fred, 23d St. & Third Ave., Brooklyn, N. Y.

LIQUID Copper Co., 85 Boston St., Boston, Mass.

LONGMAN & Martinez, 207 Pearl St., New York, N. Y.

LOWE Bros. Co., Dayton, O.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.
(See page 453.)

NATIONAL—See Tarr Marine Paint Co.

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y.

PHOENIX Paint & Varnish Works, 124 Market St., Philadelphia, Pa.

ROGERS—See Detroit White Lead Works.

SHERWIN-WILLIAMS Co., 601 Canal Rd., N. W., Cleveland, O.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y.

TARR Marine Paint Co., Rockport, Mass. "National."

TOCH Bros., 320 Fifth Ave., New York, N. Y.

WOOLSEY Paint & Color Co., C. A., Jersey City, N. J.

RUBBER PAINTS

(For refinishing rubber mats and matting)

ARNOLD, N. B., 98 Montague St., Brooklyn, N. Y. "Slikup."

CHANDLER & Brown, 1931 Broadway, New York, N. Y. "Rubber-White."

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

HAZEN-BROWN Co., 101 South St., Boston, Mass.

NORTHWESTERN Chemical Co., Marietta, O.

RUBBER-VITA—See Tingley & Co.

SLIKUP—See Arnold, N. B.

TINGLEY & Co., Chas. O., Rahway, N. J. "Rubber-Vita."

PANELS

CHARGING PANELS AND SWITCHBOARDS

ANDRAE & Sons Co., Julius, 358-64 Broadway, Milwaukee, Wis.

CROUSE-HINDS Co., 308 W. Jefferson St., Syracuse, N. Y.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 679.)

GENERAL Electric Co., Schenectady, N. Y.

KESTER Electric Co., 1000-04 S. 14th St., Terre Haute, Ind.

KRANTZ Mfg. Co., H., 106-66 Seventh St., Brooklyn, N. Y.

LA ROCHE Co., F. A., 652 Hudson St., New York, N. Y.

LANG Electric Co., J., 423 N. Lincoln St., Chicago, Ill.

LEONARD Electric Co., Ward, Bronxville, N. Y.

MARCUSON E., 136 Liberty St., New York, N. Y. "Witham."

METROPOLITAN Switchboard Co., East Ave. & 14th St., Long Island City, N. Y.

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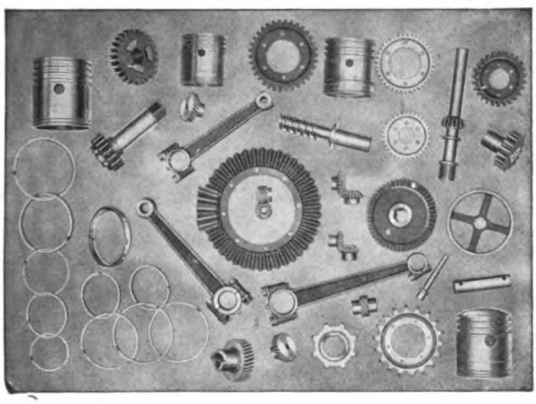

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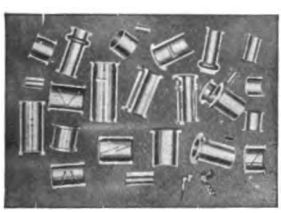

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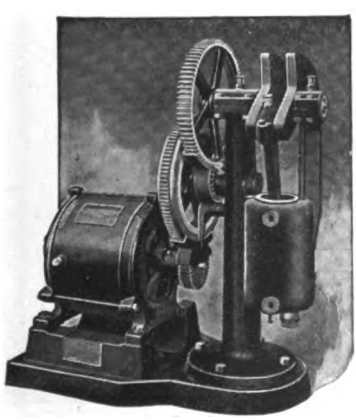

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PANELS (Continued)

CHARGING PANELS AND SWITCHBOARDS (Continued)

WESTERN Electric Co., 259 S. Clinton St., Chicago, Ill.

WITHAM—See Marcuson, E.

WOOD PANELS

ACME Veneer & Body Co., Rahway, N. J.

AMERICAN Veneer Co., 200 Market St., Kenilworth, N. J. (See page 91.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

EMPIRE Panel & Veneer Co., 940 Seneca St., Buffalo, N. Y.

JAMESTOWN Panel & Veneer Co., Jamestown, N. Y.

LOUISVILLE Veneer Mills, 1122-40 Fulton St., Louisville, Ky.

MICHIGAN Veneer Co., Alpena, Mich.

WOODMAN, Joel H., 15th, Clinton & Grand Sts., Hoboken, N. J.

PANS

DRIP PANS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Radiator Repairing Co., 1317 Vine St., Philadelphia, Pa.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)

DURLACH, I., 54 Vesey St., New York, N. Y.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. (See pages 94 and 95.)

HELSER Sheet Metal Specialty Co., 123 N. Main St., Elkhart, Ind.

KILBOURNE & Jacobs Mfg. Co., head of Lincoln St., Columbus, O.

KINSEY Mfg. Co., Toledo, O. (See page 383.)

LAWSON Co., F. H., C. H. & D. Ry. & Wheatly St., Cincinnati, O.

NOVELTY Mfg. Co., Jackson, Mich. (See page 231.)

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

REID Co., 1603 Second Ave., Moline, Ill.

ROCHESTER Can Co., 103-09 Hague St., Rochester, N. Y.

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass.

SMYTH Garage Pan Mfg. Co., Patchogue, N. Y.

STANDARD Auto Specialty Co., 57 Boerum St., Brooklyn, N. Y.

WILLIS & Sons Co., 204-06 18th St., Moline, New York, N. Y.

WILLIS & Sons Co., 204-06 18th St., Moline, Ill.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

DUST PANS OR UNDER BONNETS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AUTO Radiator Repairing Co., 1317 Vine St., Philadelphia, Pa.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

DETROIT Radiator Co., Detroit, Mich.

FEDDERS Mfg. Works, 55 Tonawanda St., Buffalo, N. Y. (See page 181.)

FOLSOM Mfg. Co., C. G., 547 Scott St., So. Bend, Ind. (See page 745.)

KEYSTONE Sheet Metal Co., Ambridge, Pa. (See page 221.)

KINSEY Mfg. Co., Toledo, O. (See page 383.)

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

STERLING Mfg. Co., 611-19 W. 55th St., New York, N. Y.

TOOPS Automobile Hood Co., 1002 Congress Ave., Indianapolis, Ind.

VAN Camp Hardware & Iron Co., Indianapolis, Ind.

XARGIL Mfg. Co., 34 Broadway, Utica, N. Y. (See page 297.)

PAPER

FRICTION PAPER

(See Frictions, Fibre)

PASTE

HAND PASTE

(See Soaps, Hand)

POLISHING PASTE

(See Polishes, Metal)

SOLDERING PASTE

(See Flux, Soldering)

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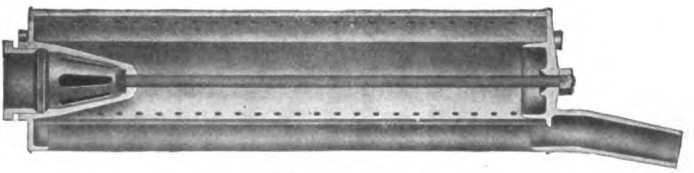
WESTERN SALES COMPANY

SELLING AGENTS

DETROIT-MICHIGAN



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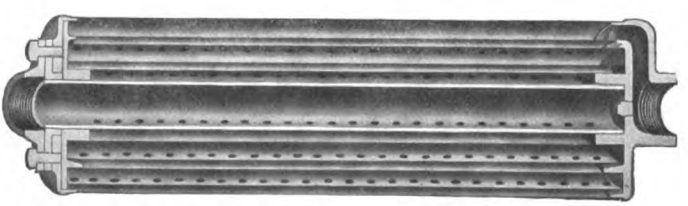
OLDBERG MUFFLERS will silence the noise of explosions, and permit the use of every pound of power in your engine.

OLDBERG MUFFLERS are self-cleaning, and will not choke up with soot, thereby retarding the speed of your engine.

OLDBERG MUFFLERS are made of the highest grade material, and will not rattle or shake apart.

OLDBERG MUFFLERS are recognized by engineers as the best mufflers on the market.

Do not waste good money on high priced transmissions, carbureters, bearings and ignition systems, then lose the power thus gained by using an inefficient muffler.



MODEL A AND B

Oldberg Manufacturing Company

DETROIT - - - MICHIGAN

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PATCHES

TIRE REPAIR PATCHES

(See also Shoes, Inner Tire; also Sleeves, Tire Repair)

AKRON—See Empire Mfg. Co.

BATAVIA Rubber Co., Batavia, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

COX, David H., Roselle, N. J.

DIAMOND Rubber Co., Akron, O. (See page 139.)

DOUBLE Fabric Tire Co., Auburn, Ind.

EMPIRE Mfg. Co., Akron, O. "Akron."

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O. (See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

HORSEY Mfg. Co., Cleveland, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KAUFMAN Oil & Grease Co., L., Pittsburg, Pa. "Neverslip."

M. & M. Mfg. Co., Akron, O.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Rubber Co., Mansfield, O.

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MORGAN & Wright, Detroit, Mich.

NEVERSLIP—See Kaufman Oil & Grease Co.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

QUICK-TITE Patch Co., Amsterdam, N. Y.

SEAMLESS Rubber Co., New Haven, Conn. (See page 567.)

SHAWMUT Tire Co., Boston, Mass. (See page 431.)

STAR Rubber Co., 405 Sweitzer Ave., Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

WASHINGTON Automobile Supply Co., Washington, Ill. (See page 631.)

PATTERNS

AUTOMOBILE PATTERN MAKERS

ACME Pattern Co., Buffalo, N. Y.

BALKWILL Pattern Works, 1449 E. 49th St., Cleveland, O.

BUFFALO Pattern Works, 13-17 Perry St., Buffalo, N. Y. (See page 519.)

EASTERN Pattern Works, 962 Champlain St., Detroit, Mich.

FORSYTH Pattern Co., Youngstown, O.

FRONTIER Engineering Co., 816-36 Fort St. W., Detroit, Mich.

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

JURACK Pattern Works, Chas., 269 Clinton St., Milwaukee, Wis.

NOBACH Pattern Works, W. J., 522-24 Jackson Blvd., Chicago, Ill.

PEERLESS Pattern Works, 405 E. Madison St., So. Bend, Ind.

PENN Mfg. Co., Chester, Pa.

PHILLIPS, C. H. & W. H., Boston, Mass.

REMMERS Pattern Co., 2121 N. Ninth St., St. Louis, Mo.

STANDARD Pattern Works, 144-46 Fort St. E., Detroit, Mich.

WALKER Bros. Co., 216 Walton st., Syracuse, N. Y.

WEST & Dodge, 384 Atlantic Ave., Boston, Mass.

PEDALS

HORN AND CUT OUT PEDALS

AREMCO—See Rothstein Mfg. Co.

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

COX Brass Mfg. Co., Albany, N. Y.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. (See page 283.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich.

MEDINA Machine & Stamping Co., Medina, N. Y.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium." (See page 615.)

MOTOR & Mfg. Works Co., Geneva, N. Y. (See page 295.)

POWELL Muffler & Timer Co., 42 Lafayette St., Utica, N. Y. (See page 297.)

RADIUM—See Milwaukee Auto Specialty Co.

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

MOTOR CYCLE PEDALS

BRIDGEPORT—See Standard Co.

FORSYTH Mfg. Co., Buffalo, N. Y.

PIRATE—See Standard Co.

STANDARD Co., 52 Norwood Ave., Torrington, Conn. "Star," "Bridgeport," "Pirate."

STAR—See Standard Co.

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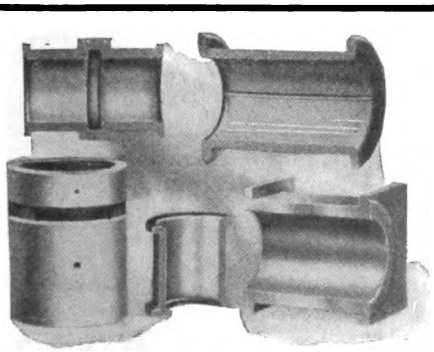

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ADAMS Co., Henry T., 6823 S. Chicago Ave., Chicago, Ill. "Quick Action."

QUICK ACTION—See Adams Co.

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(For locking Brakes, etc.)

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. (See page 283.)

PERFECT—See Garage Equipment Mfg. Co.

READING Automobile Co., 126-28 N. Fifth St., Reading, Pa. "Victor."

VICTOR—See Reading Automobile Co.

PILLOWS

LIFE PRESERVING PILLOWS

(See also Preservers, Life.)

CHICAGO Flag & Decorating Co., 1349 Wabash Ave., Chicago, Ill.

KENYON Co., R. L., Waukesha, Wis.

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

PINIONS

METAL AND RAWHIDE PINIONS

(See Gears)

PINS

COTTER PINS

AKRON Machine Co., Akron, O.

BROOKS & Sons, M. S., Chester, Conn.

COBB & Drew, Plymouth, Mass.

HINDLEY Mfg. Co., John St., Valley Falls, R. I.

JENCKES Mfg. Co., E., Worcester, Mass.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

PICKERING, R. S., Sharon Hill, Pa.

SACO—See Smith & Co.

SMITH & Co., F. P., 114 Railroad Ave., Sharon Hill, Pa. "Saco."

WHITMAN & Barnes Mfg. Co., Akron, O.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

ESCUTCHEON PINS

BLAKE & Johnson Co., Waterbury, Conn. (See page 367.)

CORBIN Screw Corp., New Britain, Conn. (See page 243.)

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa. "Keystone."

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y. (See page 355.)

KEYSTONE—See Grammes & Sons.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

TURNER & Seymour Mfg. Co., Torrington, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

TAPER PINS

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO Screw Co., 1026 Homan Ave., Chicago, Ill.

CINCINNATI Screw & Tap Co., Twightwee, O.

CORBIN Screw Corp., New Britain, Conn. (See page 243.)

DETROIT Screw Works, Detroit, Mich. (See page 739.)

HARTFORD Machine Screw Co., Hartford, Conn. (See page 737.)

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

PERRY-FAY Mfg. Co., Elyria, O.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ST. Louis Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STANDARD Tool Co., C. & P. R. R. & Central Ave., Cleveland, O.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., Elyria, O. (See page 365.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

PIPE

WROUGHT IRON AND STEEL PIPE

BYERS Co., A. M., Pittsburg, Pa.

CRANE Co., 519 S. Canal St., Chicago, Ill.

HARRISBURG Pipe & Pipe Bending Co., Harrisburg, Pa.

LA BELLE Iron Works, Steubenville, O.

LONGMEAD Iron Co., Conshohocken, Pa.

MARK Mfg. Co., Chicago, Ill.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

READING Iron Co., Reading, Pa.

SOUTH Chester Tube Co., Chester, Pa.

SPANG, Chalfant & Co., Union Bank Bldg., Pittsburg, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

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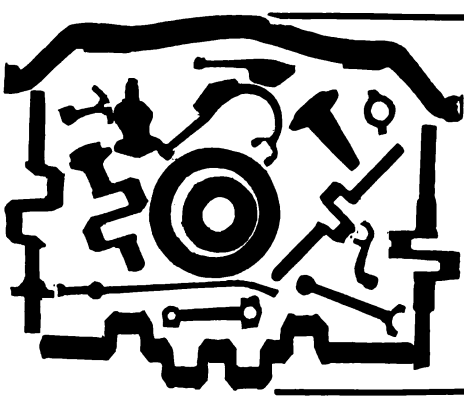

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PLATES

NAME PLATES

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AMERICAN Name Plate & Engraving Co., 352 Atlantic Ave., Boston, Mass.

AMERICAN Name Plate & Mfg. Co., 15 W. Michigan St., Chicago, Ill.
(See page 285.)

BECKER Engraving Co., August, 247 Atlantic Ave., Boston, Mass.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

BLACKINGTON & Co., V. H., Attleboro Falls, Mass.

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I.
(See page 625.)

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CENTRAL City Engraving & Electrotyping Co., 330 E. Water St., Syracuse, N. Y.

CHANDLER Co., 31 Taylor St., Springfield, Mass.

CHILDS & Co., S. D., 279 E. Monroe St., Chicago, Ill.

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 363.)

DETROIT Rubber Stamp Co., 99 Griswold St., Detroit, Mich.

ELECTRO-CHEMICAL Engraving Co., 450 19th St., Brooklyn, N. Y.

ETCHING Company of America, 2526-28 W. Congress St., Chicago, Ill.

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa.

GREACEN & Co., Walter, 12 Mechanic St., Newark, N. J.

GREENDUCK Co., Van Buren St. & Hoyne Ave., Chicago, Ill.

HAEUSERMANN Metal Mfg. Co., 1098-1102 Brook Ave., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

MULHAUPT, F. Jos., 227 N. Fifth St., La-Fayette, Ind.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NEW York Stencil Works, 100 Nassau St., New York, N. Y.

NEWARK Brass Plate Engraving Co., Newark, N. J.

QUINT'S Sons Co., S. H., 15 S. Fourth St., Philadelphia, Pa.

ROBBINS Mfg. Co., John, 58 Kneeland St., Boston, Mass.

SHEPARD Mfg. Co., Melrose Highlands, Mass.
(See page 321.)

SHONK Co., Chas. W., 135 Adams St., Chicago, Ill.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

VULCAN Mfg. Co., 1920 W. Kinzie St., Chicago, Ill.

WALTER & Sons, N. C., 194 William St., New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

PLATING

BRASS AND NICKEL PLATING

AMERICAN Car & Ship Hardware Mfg. Co., New Castle, Pa.

AUTO Parts Mfg. Co., Muncie, Ind.

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St. Chicago, Ill.
(See page 351.)

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

FRIES & Co., Buffalo, N. Y.
(See page 725.)

HILLMAN Auto Supply Mfg. Co., 98 Massachusetts Ave., Boston, Mass.

HOLT & Beebee, 40 Sudbury St., Boston, Mass.
(See page 257.)

NEHLS Plating Works, 248 Brush St., Detroit, Mich.

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

TRESAL Bronzing & Plating Co., 245-47 W 28th St., New York, N. Y.

WHITEHOUSE Mfg. Co., E. A., 44 Elm St., Newark, N. J.

PLATINUM

(See also Points, Sparking)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J.
(See page 679.)

BISHOP & Co. Platinum Works, J., Malvern, Pa.

CROSELMIRE & Ackor Co., 42 Walnut St., Newark, N. J.

DEE & Co., Thos. J. D., 26 W. Washington St., Chicago, Ill.

GOLDSMITH Bros. Smelting & Refining Co., Heyworth Bldg., Chicago, Ill.

PLATT, C. S., 16 W. 40th St., New York, N. Y.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y.
(See page 679.)

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LANG Electric Co., J., 423 N. Lincoln St., Chicago, Ill.

SPARK PLUGS

A-B Spark Plug Co., Lansing, Mich.

AC—See Champion Ignition Co.

ACME Telephone & Mfg. Co., Albia, Iowa. "Flash."

AJAX—See Auto Specialties Mfg. Co.

ALBRIGHT Ignition Co., Columbus, Ga.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Ignition Co., 67-69 Atwater St., E. Detroit, Mich. "Little Gem."

ANDERSON Spark Plug Co., 100 Boylston St., Boston, Mass.

APPLE—See Dayton Electrical Mfg. Co.

AUBURN—See New York Mica & Mfg. Co.

AUBURN Ignition Mfg. Co., Auburn, N. Y.
(See page 777.)

ALL-IN-ONE—See Buffalo Carbureter Co.

AUTO-MARINE—See Legnard Bros.

AUTO Specialties Mfg. Co., 656-58 Third St., Milwaukee, Wis. "Ajax," "Meteor."

AUTOPARTS Mfg. Co., 56 Pine St., New York, N. Y. "E. Z."

B & B—See Baskin & Blank.

BALL Multi-Spark Plug Co., 7 N. 11th St., Minneapolis, Minn.

BALLITE—See Walker Machine Co.

BAY State Screw Co., Hatfield, Mass.

BEAT-EM-ALL—See Mosler & Co.

BECCO—See Beck Co.

BECK Co., Rockville Center, N. Y. "Becco."
(See page 163.)

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Victor." "Copperhead." "Diamond."
(See page 159.)

BENFORD Mfg. Co., E. M., Mount Vernon, N. Y. "Monarch."
(See page 677.)

BEST Ignition Equipment Co., 200 W. 64th St., New York, N. Y.
(See page 677.)

BLAKE Electrical Co., Boston, Mass. "Shawmut."

BLUE BLAZE—See National Steel Products Co.

BOSCH Magneto Co., 223-25 W. 46th St., New York, N. Y.
(See page 279.)

BOUGIE-MERCEDES—See Herz & Co.

BREECH-BLOCK—See Mosler & Co.

BUFFALO Carbureter Co., Grand River Ave. & Stanton St., Detroit, Mich. "All-in-one."
(See page 409.)

BURNHAM Spark Plug Co., East Edgecomb, Me.

CENTERFIRE—See Milwaukee Auto Specialty Co.

CHAMPION Ignition Co., Flint, Mich. "AC."
(See page 325.)

CHAMPION Spark Plug Co., 609 Jefferson Ave., Toledo, O.
(See page 327.)

CHARTER & Co., Hoopeston, Ill.

CHICAGO-RACINE Aluminum, Brass Iron Works, 224-30 W. Huron Chicago, Ill.
(See page 351.)

CINCINNATI Spark Plug Co., Cincinnati, O.

COMET—See Oakes & Dow Co.

CONQUEROR, JR.—See O. K. Mica Core Co.

COPPERHEAD—See Beckley-Ralston Co.

COX, David H., Roselle, N. J. "Cox-Edick."

COX-EDICK—See Cox, David H.

CROSSMAN, E. R., 30 Church St., Worcester, Mass. "Windsor."

CZAR—See Syracuse Specialty Co.

DAY, Geo. F., 21 Haverhill St., Boston, Mass.

DAYTON Electrical Mfg. Co., 32 S. St. Clair St., Dayton, O. "Apple."

DELTA Mfg. Co., Bloomfield, N. J.

DIAMOND—See Beckley-Ralston Co.

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importer.) "Edco."

DOW Mfg. Co., Braintree, Mass.

E.Z.—See Autoparts Mfg. Co.

EDCO—See Dien Importation Co.

EDISON—See Jeffery-DeWitt Co.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."
(See page 741.)

EMPIRE—See Grant Mfg. & Machine Co.

ETNA Electric Works, 145 E. 23d St., New York, N. Y.

EXCELSIOR Supply Co., 233-37 Randolph St., Chicago, Ill.

EYQUEM—See Montgomery & Co.

FAIRMOUNT Automobile Co., 126-28 E. King St., Lancaster, Pa.

FLASH—See Acme Telephone & Mfg. Co.

FLASH LIGHT—See Janney, Steinmetz & Co.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

GOODSON Electric & Mfg. Co., Providence, R. I.

GOTHAM—See Hardy Co.

GRANT Mfg. & Machine Co., 100 Stillman Ave., Bridgeport, Conn. "Empire."
(See page 501.)

GROSSMAN Co., Emil, 248-50 W. 54th St., New York, N. Y. "Red Head."

HADES, Jr.—See Igniter Appliance Co.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.
(See page 643.)

HAMPSHIRE Mfg. Co., Hatfield, Mass. "Star."

HARDY Co., R. E., Austin Ave. and May St., Chicago, Ill. "Sta-Rite," "Venus," "Vulcan," "Gotham."
(See page 631.)

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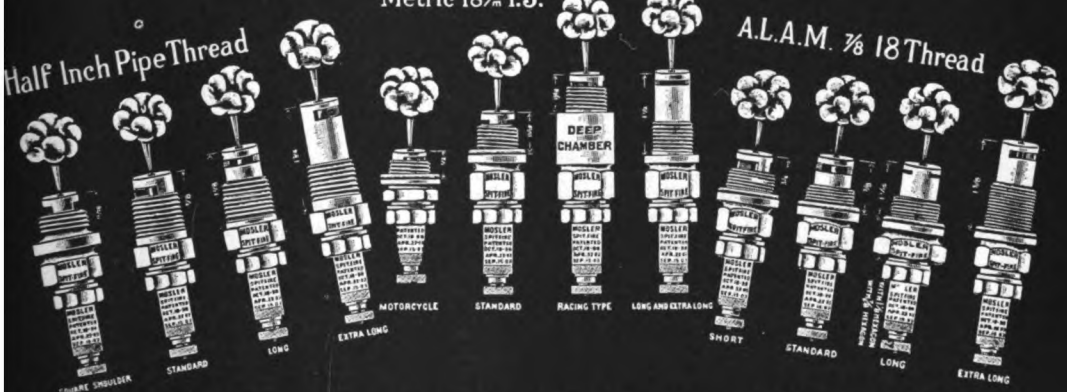

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HERBERT, W. H., 3312 Wabash Ave., Chicago, Ill. "Little Giant."

HERZ & Co., Puck Bldg., New York, N. Y. "Bougie-Mercedes." (See page 335.)

HIGH Frequency Ignition Coil Co., 126½ E. Main St., Los Angeles, Cal. "Seeley."

IDEAL Switch Co., Plainville, Conn.

IGNITER Appliance Co., 309 Electric Bldg., Cleveland, O. "Hades Jr."

INDIAN—See Templeton-Barrett Co.

J-D—See Jeffery-Dewitt Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Flash Light." (See page 657.)

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich. "Reliance." "J.-D." "Edison." (See page 327.)

JEWELL—See Pittsfield Spark Coil Co.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LEGNARD Bros., 203-05 N. Genesee St., Waukegan, Ill. "Auto-Marine."

LEHMAN Mfg. Co., J. H., 500 Fifth Ave., New York, N. Y.

LEMKE Electric Co., 280-82 Lake St., Milwaukee, Wis.

LITTLE GEM—See American Ignition Co.

LITTLE GIANT—See Herbert, W. H.

LIVE WIRE—See Templeton-Barrett Co.

LOCKE Regulator Co., 76 North St., Salem, Mass. "New Challenge."

LOCKWOOD Ash Motor Co., 210 W. Cortland St., Jackson, Mich.

LONG Bros., Kokomo, Ind.

MAC-KAE Mfg. Co., 185 Amory St. (Jamaica Plain), Boston, Mass. (See page 631.)

MAMMOTH—See O. K. Mica Core Co.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y. (See page 615.)

METEOR—See Auto Specialties Mfg. Co.

MEZGER, C. A., 239 W. 56th St., New York, N. Y. "Soot Proof."

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Centerfire," "Victor." (See page 615.)

MONARCH—See Benford Mfg. Co.

MONROE Electric Mfg. Co., Box 57, Monroe, Mich. (See page 631.)

MONTGOMERY & Co., 105 Fulton St., New York, N. Y. (Importers). "Eyquem."

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y. "Spit Fire," "Triumph," "Beat-em-all," "Breech-Block." (See page 323.)

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers). "Pognon." "Power."

NATIONAL Coil Co., Lansing, Mich. (See page 245.)

NATIONAL Steel Products Co., Lorain, O. "Blue Blaze."

NEVER-MISS Mfg. Co., Lansing, Mich. (See page 421.)

NEW CHALLENGE—See Locke Regulator Co.

NEW York Mica & Mfg. Co., Auburn, N. Y. "Auburn," "Wright."

O. K. Mica Core Co., 87 Liberty St., Brooklyn, N. Y. "Conqueror, Jr." "Mammoth." "Torpedo." "Vulcano."

OAKES & Dow Co., 15 Chardon St., Boston, Mass. "Comet." "Sootless."

ORSWELL Igniter Co., 81 Haverhill St., Boston, Mass.

PERFEX—See Electric Goods Mfg. Co.

PHILLIPS-POTVIN Mfg. Co., Minneapolis, Minn. "Vizzo."

PITTSFIELD Spark Coil Co., Dalton Mass. "Jewell." (See page 277.)

POGNON—See Motor Car Equipment Co.

POINT Spark Plug Co., Aberdeen, S. D.

POWER—See Motor Car Equipment Co.

RAJAH Auto Supply Co. (Watsessing Station), Bloomfield, N. J. (See page 421.)

RED HEAD—See Grossman Co.

REFLEX Ignition Co., 6919 Lexington Ave., Cleveland, O.

RELIANCE—See Jeffery-Dewitt Co.

RICH-SPARK—See Richardson Engineering Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SEELEY—See High Frequency Ignition Coil Co.

SHAIN, Chas. D., 1926 Broadway, New York, N. Y. (See page 589.)

SHARP Spark Plug Co., 4237 Pearl Rd., Cleveland, O.

SHAWMUT—See Blake Electrical Co.

SHERMAN & Son, G. H., 419 St. Aubin Ave., Detroit, Mich.

SIMMS Magneto Co., 1780 Broadway, New York, N. Y. (See page 275.)

SIMPLEX Tool & Supply Co., 201 Devonshire St., Boston, Mass.

SOOT PROOF—See Mezger, C. A.

SOOTLESS—See Oakes & Dow Co.

SPARKO Mfg. Co., 1779 Broadway, New York, N. Y.

SPIT FIRE—See Mosler & Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 719.)

STA-RITE—See Hardy Co.

STAR—See Hatfield Mfg. Co.

STERLING Co., Lafayette, Ind.

SUPERIOR Motor Specialty Co., 44 N. Fourth St., Philadelphia, Pa.

SURE FIRE—See U. S. Auto Supply & Mfg. Co.

SYRACUSE Specialty Co., Clinton Blk., Syracuse, N. Y. "Czar."

Complete Index to Classification appears on Pages 8 to 22.

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PLUGS (Continued)

SPARK PLUGS (Continued)

TEMPLETON-BARRETT Co., Marinette, Wis. "Indian," "Live Wire."

TORPEDO—See O. K. Mica Core Co.

TRIUMPH—See Mosler & Co.

U. S. Auto Supply & Mfg. Co., 372 Michigan Ave., Detroit, Mich. "Sure Fire."

UKO—See Utility Co.

UTILITY Co., 639 W. 44th St., New York, N. Y. "Uko."

VANGUARD Mfg. Co., Joliet, Ill. (See page 373.)

VENUS—See Hardy Co.

VICTOR—See Beckley-Ralston Co.

VICTOR—See Milwaukee Auto Specialty Co.

VIZZO—See Phillips-Potvin Mfg. Co.

VOLCANO Spark Plug Co., Ashland, O.

VULCAN—See Hardy Co.

VULCANO—See O. K. Mica Core Co.

WALKER Machine Co., G. A., 51 Chardon St., Boston, Mass. "Ballite."

WASHINGTON Automobile Supply Co., Washington, Ill. (See page 631.)

WICO—See Witherbee Igniter Co.

WILLARD-HARLOW Mfg. Co., Janesville, Wis.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WINDSOR—See Crossman, E. R.

WITHERBEE Igniter Co., Springfield, Mass. "Wico." (See page 163.)

WRAY Mfg. Co., 411 Pemberton Bldg., Boston, Mass.

WRIGHT—See New York Mica & Mfg. Co.

TIRE REPAIR PLUGS

BATAVIA Rubber Co., Batavia, N. Y.

DIAMOND Rubber Co., Akron, O. (See page 139.)

HARTFORD Rubber Works Co., Hartford, Conn.

GOODRICH Co., B. F., Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

POINTS

SPARKING POINTS

(See also Platinum)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J. (See page 679.)

BISHOP & Co. Platinum Works, J., Malvern, Pa.

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers). "Meteor."

CROSELMIRE & Ackor Co., 42 Walnut St., Newark, N. J.

DRIVER-HARRIS Wire Co., Harrison, N. J.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

QUEEN Co., Eighth & Arch Sts., Philadelphia, Pa.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y. (See page 679.)

POLES

FLAG POLES

BATCHELDER & Co., C. A., 234 State St., Boston, Mass.

NEW York Boat Oar Co., 69 West St., New York, N. Y.

POLISHES

AUTOMOBILE BODY POLISHES

(See also Soaps, Automobile)

A1—See Rath Co.

A-O-K—See Ulrich & Co.

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y. "Apollo."

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Hy-Pol."

ANDERSON Varnish Co., 3214 Sheffield Ave., Chicago, Ill.

APOLLO—See Adams Grease & Oil Co.

AQUILA Chemical Co., 1707½ Fond du Lac Ave., Milwaukee, Wis.

ARLINGTON Mfg. Co., Canton, O.

AUTO-KLEAN—See Lucas & Co., John.

AUTO-SHINE—See Nesmith Co.

AUTOLAC Mfg. Co., 915 Huron Rd., Cleveland, O. (See page 329.)

AUTOSHINE—See Royal Polish Co.

BAILEYS—See Crown Mfg. Co.

BRIDGEPORT Wood Finishing Co., New Milford, Conn.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUFFALO Oil, Paint & Varnish Co., Buffalo, N. Y.

BUFFALO Specialty Co., 375 Ellicott St., Buffalo, N. Y. "Liquid Veneer."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa.

COLUMBIA Lubricants Co. of New York, 116 Broad St., New York, N. Y.

CROWN Mfg. Co., 407 S. Illinois St., Indianapolis, Ind. "Baileys." (See page 329.)

CUNNINGHAM—See Pitt Specialty Co.

DETROIT Varnish Co., Milwaukee St. & Widman Pl., Detroit, Mich. "Rogers."

GLISTENER Mfg. Co., 622 Cypress Ave., Kansas City, Mo. "Lee's." "Varnishine."

GOLDEN STAR—See Morris Mfg. Co.

GYPSO—See Lothrop, A. S. B.

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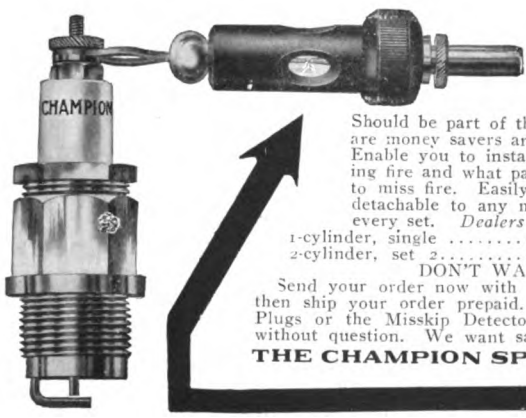

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

HOLLINGSHEAD Co., R. M., Camden, N. J. "Nugloss."

HY-POL—See Adams & Elting Co.

JEWEL Mfg. Co., 21st St. & Marshall Blvd., Chicago, Ill. "Nelsons."

KOONSHINE—See St. Louis Surfacer & Paint Co.

LEE'S—See Glistener Mfg. Co.

LEVO—See Stanley, John T.

LIQUID VENEER—See Buffalo Specialty Co.

LOTHROP, A. S. B., Worcester, Mass. "Gypso."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa. "Auto-Klean."

MAGICLEAN—See Schmoeger, Frederic A.

MAT'S—See Weiss Polish Works.

MEXICAN Mfg. Co., 239 S. Market St., Wichita, Kans.

MODOC Co., Fernwood, Pa.

MONARCH—See Suydam Co.

MORRILL, M. O., 172 W. 124th St., New York, N. Y. "Tar-Co-La."

MORRIS Mfg. Co., R. W., 17 E. Missouri Ave., Kansas City, Mo. "Golden Star."

NELSONS—See Jewel Mfg. Co.

NESMITH Co., C. I., Reading, Mass. "Auto-Shine."
(See page 759.)

NORTHWESTERN Chemical Co., Marietta, O. "Shi-Nez."

NOXALL Polish Mfg. Co., 1238 Belmont Ave. Philadelphia, Pa.

NUGGET Polish Co., 299 Broadway, New York, N. Y.

NUGLOSS—See Hollingshead Co.

O. K.—See Sheppard, W. S.

PEERLESS Cleaner Co., Glenolden, Pa.

PERUVIAN—See Sweet, Chas. F.

PITT Specialty Co., 602 Curry Bldg., Pittsburg, Pa. "Cunningham."

PROTECTROID Co., 1123 Broadway, New York, N. Y.

RAPID—See Shannon, T. R.

RATH Co., Chas. H., 1347 N. Front St., Philadelphia, Pa. "A1."

RIE Nie Mfg. Co., 919 First Ave., S., Minneapolis, Minn.
(See page 331.)

ROGERS—See Detroit Varnish Co.

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y.

ROYAL Polish Co., 201-03 W. 63d St., Chicago, Ill. "Autoshine."

ST. Louis Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo. "Koonshine."

SCHMOEGER, Frederic A., Sterling, Ill. "Magiclean."

SHANNON, T. R., 19 Lorraine St., Hartford, Conn. "Rapid."
(See page 655.)

SHI-NEZ—See Northwestern Chemical Co.

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "O. K."

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Levo."

SUYDAM Co., M. B., 61st St. & A. V. Ry., Pittsburg, Pa. "Monarch."

SWEET, Chas. F., 20 Ford St., Hartford, Conn. "Peruvian."

TAR-CO-LA—See Morrill, M. O.

U-AUTO Varnish Co., 345 The Arcade, Cleveland, O.

ULRICH & Co., 227-33 E. North St., Buffalo, N. Y. "A-O-K."

UNCLE Sam Polish Co., 335 Monroe Ave., Detroit, Mich.

VANGUARD Mfg. Co., Joliet, Ill.
(See page 373.)

VARNISHINE—See Glistener Mfg. Co.

VERA Mfg. Co., 12th & Olive Sts., St. Louis, Mo.

WEISS Polish Works, Chicago, Ill. "Mat's."
(See page 655.)

METAL POLISHES

A1—See Rath Co.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Shinite."

AL-LECTRO—See Allen Co.

ALLEN Co., L. B., 1123 V Columbia Ave., Chicago, Ill. "Al-lectro."
(See page 503.)

AMALIE—See Sonneborn Sons.

AMERICAN—See Harvey Chemical Co.

AMERICAN Metal Polish Co., 89 Winslow Ave., W., West Somerville, Mass. "North Star," "Meyers."

AMERICAN Oil & Disinfectant Co., 96 Beekman St., New York, N. Y. "Sparrow."

ANCHOR—See Hoffman Paint & Varnish Co.

A-O-K—See Ulrich & Co.

APEX—See Cincinnati Oil Works Co.

ARCO Spotzoff—See Atlantic Refining Co.

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

ATLANTIC Refining Co., 2 Wise Bldg., Cleveland, O. "Arco Spotzoff."
(See page 285.)

ATLAS Auto Supply Co., 24 Adams St., Chicago, Ill. "Sta-Brite."
(See page 157.)

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

AUTO-SHINE—See Paul & Co.

BAILEYS—See Crown Mfg. Co.

BAKER & Co., C. P., 1112 Mt. Vernon St., Philadelphia, Pa.

BAUM'S Castorine Co., Rome, N. Y.

BAUR Bros, 677 Summit Ave., Jersey City, N. J.

BELL Mfg. Co., 113 Morgan St., St. Louis, Mo. "Star."

BEN Hur Metal Polish Co., 108 E. Market St., Crawfordsville, Ind.

BLACK HAWK—See Taylor Mfg. Co.

BLUE RIBBON—See International Metal Polish Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Peerless."

BOLTON, Geo. W., 733 Woodward Ave., Detroit, Mich. "Simplex."

BORSUM Bros., 182 Greenwich St., New York, N. Y.

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POLISHES (Continued)

METAL POLISHES (Continued)

BOTT Bros. Mfg. Co., 166 N. High St., Columbus, O. "Nays."

BUFFALO—See Ulrich & Co.

BULLY—See New York Oil & Paint Co.

BURNISHINE—See Paul & Co.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa. "Winterton."

CHEMICAL Supply Co., 1565 Merwin St., Cleveland, O.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CHILDS Co., G. B., 499 Greenwich St., New York, N. Y.

CINCINNATI Oil Works Co., 323 Sycamore St., Cincinnati, O. "Apex."

CLAPPER & Co., S. C., Nassau, N. Y.

CLEANER Mfg. Co., 2842 Olive St., St. Louis, Mo. "Polishine."

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa. "Spe-De-Shyne."

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y.

CONSOLIDATED Chemical Co., 208 W. Kinzie St., Chicago, Ill.

CROSS & Co., W. H., 29 Murray St., New York, N. Y. "Gilt Edge," "Laquerine." "Prestoline," "Putzade."

CROWELL Chemical Co., Beverly, Mass. "Oxford."

CROWN Mfg. Co., 407 S. Illinois St., Indianapolis, Ind. "Baileys."
(See page 329.)

CURRY Bros. Oil Co., 284 Franklin St., Boston, Mass. "Superba."

DETROIT Varnish Co., Milwaukee St. & Widman Pl., Detroit, Mich. "Rogers."

EAGLE Mfg. Co., 383 Prospect St., Cleveland, O.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine."
(See page 217.)

EAGLEINE—See Eagle Oil & Supply Co.

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass. "Shineaul."

EVER-BRITE—See Page-Lester Co.

EVERBRYTE—See Winn, Wm. R.

FAIRCHILD & Bro., M. H., 20 W. Michigan St., Chicago, Ill.

FILBING Chemical Co., 238-40 Reed St., Milwaukee, Wis. "Lusterine."

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FLASHLIGHT—See Ives Polish Co.

FORD & Dennan—See Richmond & Co.

G.W.—See Great Western Oil Co.

GILT EDGE—See Cross, W. H.

GLITTERSHINE—See Grady Mfg. Co.

GLOBE—See Raimes & Co.

GOLDEN GLITTER—See Mooney, A. J.

GRADY Mfg. Co., 509 W. 30th St., New York, N. Y. "Glittershine," "National," "Putz," "Uno," "Scouree."

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "G.W."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. "Souree."
(See page 307.)

HARVEY Chemical Co., N. Fifth St., Lafayette, Ind. "American."

HEANEY Mfg. Co., 164 State St., Boston, Mass.

HERCULES Chemical Works, 1904 W. Van Buren St., Chicago, Ill. "Non-Such."

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Ruby-Rub."

HOFFMAN, Geo. W., 549 E. Washington St., Indianapolis, Ind. "U. S."

HOFFMAN Paint & Varnish Co., 8 Medford St., Boston, Mass. "Anchor."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HYGLO—See Stanley, John T.

IDEAL—See Walsh & Co.

IDEALO Co., 321 Bourse, Philadelphia, Pa.

INTERNATIONAL Metal Polish Co., 2142 N. Capital Ave., Indianapolis, Ind. "Blue Ribbon."

IVES Polish Co., 383 First St., Newburgh, N. Y. "Flashlight."

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J-M."

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KOONSHINE—See St. Louis Surfacer & Paint Co.

KORTUM Mfg. Co., 10-12 Pearl St., Buffalo, N. Y. "Zircon."

KOSMOS—See Mulliken Oil Co.

LAQUERINE—See Cross, W. H.

LAURIE & Co., John, 171 Randolph St., Chicago, Ill.

LEADER Mfg. Co., 1808 Chestnut St., St. Louis, Mo. "Metal-Brite."

LIGHTNING Flash Specialty Co., 236 E. Fifth St., Cincinnati, O.

LORD Polish Co., F. T., 37 Hovey Ave., Cambridge, Mass. "Lumino."

LUMINO—See Lord Polish Co.

LUSTERINE—See Filbing Chemical Co.

McLEAN-JONES Oil & Supply Co., 65 Long Wharf, Boston, Mass. "Nox-All."

MAGIC—See Sweet, Chas. F.

MATCHLESS Metal Polish Co., 149 Varick St., New York, N. Y. "Mexoline."

METAL-BRITE—See Leader Mfg. Co.

METALINE—Victor Mfg. Co.

MEXICAN Mfg. Co., 239 S. Market St., Wichita, Kan. "Venus."

MEXOLINE—See Matchless Metal Polish Co.

MEYERS—See American Metal Polish Co.

MODOC Co., Fernwood, Pa.

MONARCH—See Suydam Co.

MOONEY, Arthur J., 359-61 Ninth Ave., New York, N. Y. "Golden Glitter."
(See page 387.)

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

NATIONAL—See Grady Mfg. Co.

NAYS—See Bott Bros. Mfg. Co.

Complete Index to Classification appears on Pages 8 to 22.

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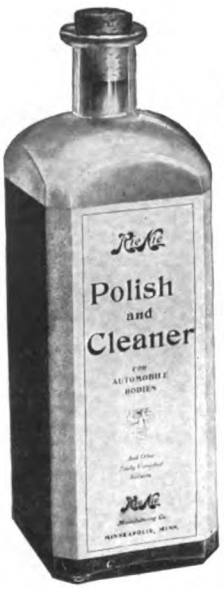
Rie Nie

Mohair Top Cleaner—Body Polish and Cleaner—Valve Grinding Compound—Enamel Dressing—Cylinder Paint



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POLISHES (Continued)

METAL POLISHES (Continued)

NAY Chemical Co., Holden, Mo.

NEW Jersey Paint Works, Jersey City, N. J.

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y. "Bully."

NON-SUCH—See Hercules Chemical Works.

NORTH STAR—See American Metal Polish Co.

NORTHWESTERN Chemical Co., Marietta, O. "Shi-Nez."

NOX-ALL—See McLean-Jones Oil & Supply Co.

NOXAL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa.

OXFORD—See Crowell Chemical Co.

PAGE-LESTER Co., 134 Van Buren St., Chicago, Ill. "Ever-Brite."

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PAUL & Co., J. C., 59 Dearborn St., Chicago Ill. "Auto-Shine," "Burnishine."

PEERLESS—See Blue Ribbon Mfg. Co.

POLESHINE—See Cleaner Mfg. Co.

PRESTOLINE—See Cross, W. H.

PRESTOSHINE—See Sheppard, W. S.

PURITAN Soap Co., 502 Exchange St., Rochester, N. Y.

PUTZ—See Grady Mfg. Co.

PUTZADE—See Cross, W. H.

QUAKER Soap Co., 207-13 Provost St., Jersey City, N. J.

RAIMES & Co., New York, N. Y. "Globe."

RATH Co., Chas. H., 1347 N. Front St., Philadelphia, Pa. "A1."

RAYDO—See Ulrich & Co.

RAYO Co., 5 Nassau St., New York, N. Y.

RED CROSS—See Robertson & Co.

REID Mfg. Co., W. W., 79 Milk St., Boston, Mass.

RELIABLE Cement Co. (E. Akron), Akron, O.

REX—See Armiger Chemical Co.

REXINE Co., 725 New York Ave., Sheboygan, Wis.

RICHMOND & Co C. C., 40 Batterymarch St., Boston, Mass. "Ford & Dennan."

ROBERTSON & Co., 1141 W. Madison St., Chicago, Ill. "Red Cross."

ROGERS—See Detroit Varnish Co.

ROSTAND Mfg. Co., Milford, Conn.

ROYAL Lubricating Oil Co., 116 Broad St.,

RUBY-RUB—See Hinds & Coon.

ST. Louis Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo. "Koonshine."

SCHMOEGER, Frederic A., Sterling, Ill.

SCOUREE—See Grady Mfg. Co.

SOUREE—See Harris Oil Co.

SHEPPARD, W. S., 22 Lawrence St., Newark, N. J. "Prestoshine."

SHINAL—See Adams & Elting Co.

SHI-NEZ—See Northwestern Chemical Co.

SHINEAUL—See Ericka Mfg. Co.

SIMPLEX—See Bolton, Geo. W.

SOLARINE Co., 153-55 N. Carpenter St., Chicago, Ill.

SOLSHINE Mfg. Co., 204 Milk St., Boston, Mass.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPARROW—See American Oil & Disinfectant Co.

SPE-DE-SHYNE—See Cleanola Co.

SPEARE'S Sons Co., Alden, 367 Atlantic Ave., Boston, Mass.

STA-BRITE—See Atlas Auto Supply Co.

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Hygie."

STAR—See Bell Mfg. Co.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich.
(See pages 547 and 548.)

SUPERBA—See Curry Bros. Oil Co.

SUYDAM Co., M. B., 61st St. & A. V. Ry., Pittsburg, Pa. "Monarch."

SWEET, Chas. F., 20 Ford St., Hartford, Conn. "Magic."

TAYLOR Mfg. Co., 468 Main St. (Charlestown), Boston, Mass. "Black Hawk."

TRAFTON Co., F. M., 176 Federal St., Boston, Mass.

U. S.—See Hoffman, Geo. W.

ULRICH & Co., 227-33 E. North St., Buffalo, N.Y. "A-O-K," "Buffalo," "Raydo."

UNCLE Sam Polish Co., 335 Monroe Ave., Detroit, Mich.

UNO—See Grady Mfg. Co.

UTILITY Co., 639 W. 44th St., New York, N. Y.

VENUS—See Mexican Mfg. Co.

VICTOR Mfg. Co., 72 Chestnut St., Newark, N. J. "Metaline."

WALSH & Co., John F., 28 Renne Ave., Pittsfield, Mass. "Ideal."

WHIZ—See Hollingshead Co.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Everbryte."

WINTERTON—See Callery & Co.

YALE—See Rostand Mfg. Co.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.

ZIRCON—See Kortum Mfg. Co.

PORCELAIN

ARTISTIC Porcelain Co., Chambers, William & Cedar Sts., Trenton, N. J.

BRUNT Porcelain Co., G. F., S. Market St., E. Liverpool, O.

DIAMOND Porcelain Co., Chauncey St., Trenton, N. J.

EMPIRE China Works, 142-56 Greene St., Brooklyn, N. Y.

GARY Co., Theo. H., 41 Union Sq., New York, N. Y. (Importers.) "Isolit."

HARTFORD Faience Co., Hartford, Conn.

IMPERIAL Porcelain Works, Mulberry St. & New York Ave., Trenton, N. J.

ISOLIT—See Gary Co.

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich.
(See page 327.)

NATIONAL Porcelain Co., Trenton, N. J.

PERU Electric Mfg. Co., Peru, Ind.

STAR Porcelain Co., Trenton, N. J.
(See page 333.)

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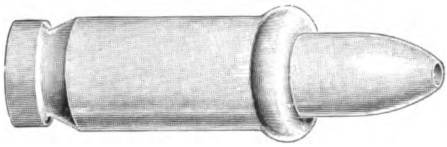

PORCELAIN
FOR
SPARK PLUGS

PERFECT INSULATION

SEND SAMPLE OR DRAWING FOR QUOTATION

THE STAR PORCELAIN COMPANY

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TRENTON, N. J.

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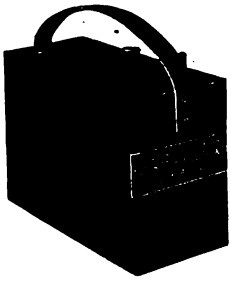
FRENCHTOWN, N. J.



"AUTO" BATTERIES

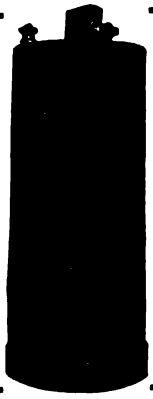
HONEST RATINGS GUARANTEED

TYPE	SIZE	WEIGHT
6-40	8¼ x 5½ x 8½	25 lbs.
6-60	10¼ x 5½ x 8½	30 lbs.
6-100	10¼ x 7¾ x 8½	49 lbs.
6-175	15½ x 8¼ x 9	80 lbs.

HIGH GRADE BATTERIES AT MEDIUM PRICES
ATTRACTIVE AGENCY PROPOSITIONS

ELECTRIC LIGHT EQUIPMENTS

AUTO BATTERY & ELECTRICAL CO.
119 West Tupper Street BUFFALO, N. Y.



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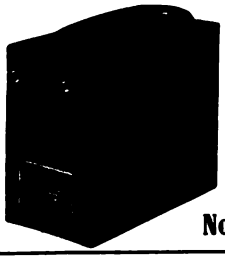
lower the efficiency of your engine by using inferior batteries for ignition when you can buy RED TOP COLUMBIA IGNITOR cells—the BEST MADE for the SAME MONEY.

No Extra Charge for Fahnestock Clips

NATIONAL CARBON CO.
Cleveland, O.

ORDER NORTHWESTERN



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FOR AUTOMOBILES
AND MOTOR BOATS

LIBERAL DISCOUNTS TO THE TRADE

Write for Catalogue "D"

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PRESERVERS

LIFE PRESERVERS

(See also Pillows, Life Preserving.)

A-B-C—See Welin Davit & Lane & De Groot Co.

ARMSTRONG Cork Co., Pittsburg, Pa.

BOSTON Cork Works, 52 Purchase St., Boston, Mass.

DABOL Rubber Co., Providence, R. I.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

INST Lighter Co., 326 S. Front St., Columbus, O.

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

TOMPKINS & Co., John W., 46-48 14th St., Hoboken, N. J.

WELIN Davit & Lane & De Groot Co., 305-15 Vernon Ave., Long Island City, N. Y. "A-B-C."

PRIMERS

GASOLINE ENGINE PRIMERS

ADMIRAL Garage & Repair Works, Admiral Blvd., Kansas City, Mo.

ASSISTANT Starter Co., 514 W. 57th St., New York, N. Y.

CARTER & Peck, Carter Bldg., Jackson, Mich. "Lockwood."

CRONE, F. G., 334 E. Genesee St., Buffalo, N. Y.

GARLOCK Auto Specialty Co., 50 Main St., Palmyra, N. Y. "Whiting."

HOFWEBER—See Motor Devices Mfg. Co.

LOCKWOOD—See Carter & Peck.

MOTOR Devices Mfg. Co., 316 S. Fourth St., La Crosse, Wis. "Hofweber."

WHITING—See Garlock Auto Specialty Co.

PRODUCERS

GAS PRODUCERS

ADMIRALTY Power Co., Port Richmond, N. Y.

GALUSHA & Co., A. L., 215 Norfolk St., (Dorchester Center), Boston, Mass.

MARINE Producer Gas Power Co., 2 Rector St., New York, N. Y.

PROPELLERS

AEROPLANE PROPELLERS

ACME Oil Engine Co., Bridgeport, Conn.

AERIAL Navigation Co. of America, Girard, Kan. "Call."

AMERICAN Propeller Co., 616 G St., N. W., Washington, D. C. "Paragon."

ATKIN-WHEELER Co., New York Ave., Halesite, N. Y.

BONSON, E. W., 806 Eleventh Ave., New York, N. Y. "Requa-Gibson."

BRAUNER & Co., P., 330-32 E. 98th St., New York, N. Y. "Paragon."

CALL—See Aerial Navigation Co.

CHARAVAY—See Chelsea Aero Co.

CHELSEA Aero Co., 513-17 W. 23d St., New York, N. Y. "Charavay."

COFFIN, Alonzo, 67 Main St., San Francisco, Cal. "Parabolel."

GYRO—See Scientific Aeroplane Co.

HARRIS-GASSNER Co., 1211 West End Trust Bldg., Philadelphia, Pa.

KIRKHAM-EELLS Aeroplane Co., Bath, N. Y.

PARAGON—See American Propeller Co.

PARAGON—See Brauner & Co.

PARABOLEL—See Coffin, Alonzo.

REQUA-GIBSON—See Bonson, E. W.

RUBEL, Jr., & Co., R. O., Louisville, Ky.

SCIENTIFIC Aeroplane Co., 361 Broadway, New York, N. Y. "Gyro."

STUPAR, M., 9626 Erie Ave., Chicago, Ill.

PROPS

CAR PROPS OR SUPPORTS

(See Jacks, Car Supporting)

PROTECTORS

SLEEVE AND CUFF PROTECTORS

B. E. Mfg. Co., 38 White St., New York, N. Y.

GORDON—See Vehicle Apron & Hood Co.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

TIRE PROTECTORS

(See Treads, Detachable; also Shoes, Inner Tire.)

PUMPS

AUTOMATIC BILGE PUMPS OR BAILERS

AUTOMATIC Bilge Bailer Co., 150 Huntington Ave., Boston, Mass. "Hitchcock."

HITCHCOCK—See Automatic Bilge Bailer Co.

JAGER Co., Chas. J., 281-85 Franklin St., Boston, Mass.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

ENGINE DRIVEN TIRE PUMPS

A.B.C.—See Artizan Brass Co.

ARISTO—See Eagle Mfg. Co.

ARTIZAN Brass Co., 872 Lincoln Park Blvd., Chicago, Ill. "A.B.C."

AUBURN Auto-Pump Co., 537 Tremont St., Boston, Mass. "Ten Eyck."

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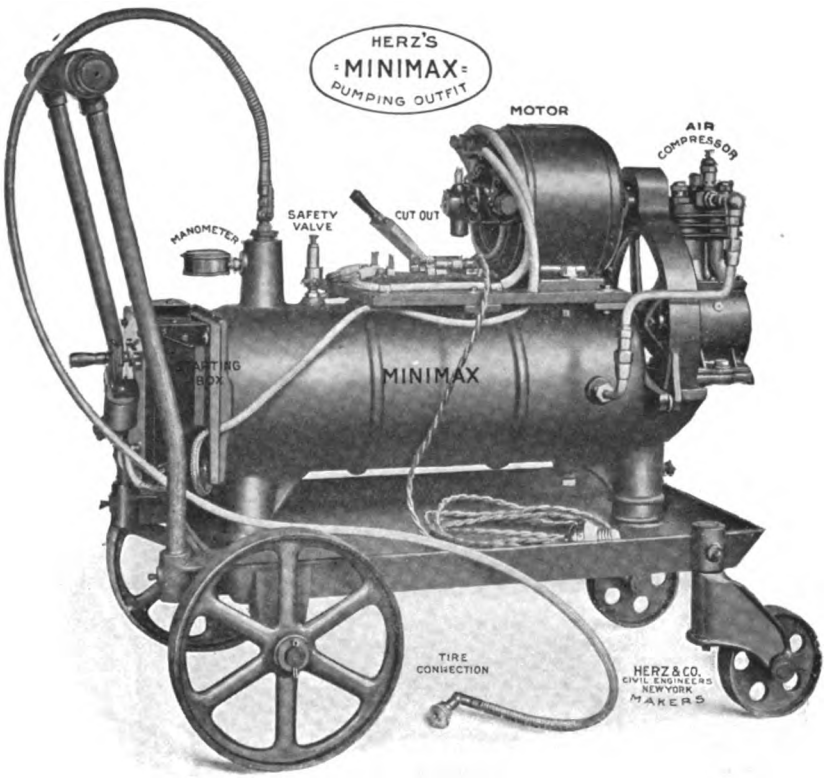
HERZ'S GARAGE PUMP



Total Height, 27 in.; Length, 35 in.; Weight, 230 lbs.; Double Cylinder Air Compressor; Piston Rings; Splash Lubrication.

It does away with those expensive to install and more expensive to run stationary pipe lines.

To run the Minimax costs practically nothing. No losses by leakage. Made for any kind of current.

Just Wheel It Where It's Needed and Connect to Nearest Lamp Socket
The Tank Will Hold Enough Air to Inflate Four Tires Outside of the Garage

150 Pounds in Three Minutes

BE MODERN! SAVE MONEY! SAVE TIME!

Write Us at Once for Full Particulars

HERZ & CO., Mfg. Civil Engineers Puck Building, New York

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PUMPS (Continued)

ENGINE DRIVEN TIRE PUMPS (Continued)

AUTO Pump Co., 19 Main St., Springville, N. Y. "Spencer." (See page 673.)

AUTO Specialty Co., 121 S. Main St., Dayton, O. "Gem."

B. B.—See Herz & Co.

BASTIAN—See Olney Automobile Co.

BERGSTROM, Oscar M., 308-12 S. Ninth St., Minneapolis, Minn. "O. B."

BI-PLEX—See Motor Specialties Co.

EAGLE Mfg. Co., 651-67 Blue Rock St., Cincinnati, O. "Aristo."

EBERMAN Auto Appliance Co., 338 Wisconsin St., Chicago, Ill.

E-Z—See Wheaton & Co.

GEM—See Auto Specialty Co.

HANNA Mfg. Co., Troy, N. Y.

HART & Widder Co., 511 W. 21st St., New York, N. Y. (See page 663.)

HARTFORD—See McIntyre Machine Works.

HERZ & Co., Puck Bldg., New York, N. Y. "B. B." "Tandem." (See page 335.)

KELLOGG Mfg. Co., E. Main & Circle Sts., Rochester, N. Y.

McINTYRE Machine Works, 205 Main St., Hartford, Conn. "Hartford."

M. & L.—See Migeot Machine Co.

MANZEL, Chas. W., 89-93 Main St., Buffalo, N. Y. (See page 649.)

MIGEOT Machine Co., 333 N. Fourth St., Philadelphia, Pa. "M. & L." (See page 463.)

MOTOR Specialties Co., Motor Mart, Boston, Mass. "Bi-Plex." (See page 363.)

O. B.—See Bergstrom, Oscar M.

OLNEY Automobile Co., Philadelphia, Pa "Bastian."

ORANGE Machine & Mfg. Co., 18-20 Stetson St., Orange, N. J.

P. T. C.—See Pacific Tucking & Mfg. Co.

PACIFIC Tucking & Mfg. Co., 471-73 18th St., Brooklyn, N. Y. "P. T. C."

PERFECTION Auto Pump Co., Auburn, N. Y.

RECTOR Engineering Co., 1 Madison Ave., New York, N. Y.

ROHRBACKER Automatic Air Pump Co., Portland, Ore.

RUNG Automatic Air Pump Co., 200 Franklin Bldg., Philadelphia, Pa.

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

SPENCER—See Auto Pump Co.

TANDEM—See Herz & Co.

TEN EYCK—See Auburn Auto-Pump Co.

TRYON Auto Pump Co., 1733-37 Broadway, New York, N. Y. (See page opposite inside back cover.)

WELD Mfg. Co., N. Chatham, Mass.

WHEATON & Co., C. M., Sunbury, Ohio. "E-Z."

HAND BASIN OR GALLEY PUMPS

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

DIEM, Gus A., 20 Fulton St., New York, N. Y.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

MARINE Hardware Co., Peabody, Mass.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass.

HAND BILGE PUMPS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

BEVIN Bros. Mfg. Co., East Hampton, Conn.

CAPE Cod Power Dory Co., Main St., Wareham, Mass.

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

GOULDS Mfg. Co., Seneca Falls, N. Y.

KAHLENBERG Bros. Co., Two Rivers, Wis.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

NATIONAL Mfg. Co., Worcester, Mass.

PERSKY & Co., F., 52 Elizabeth St., New York, N. Y.

RUMSEY & Co., Seneca Falls, N. Y.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

TRIMOUNT Rotary Power Co., 144-54 Pearl St., Boston, Mass.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

HAND DECK PUMPS

GOULDS Mfg. Co., Seneca Falls, N. Y.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

RUMSEY & Co., Seneca Falls, N. Y.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

HAND TIRE PUMPS

AEOLUS—See Bridgeport Brass Co.

AERTITE—See Keystone Novelty Co.

ATLAS—See Bridgeport Brass Co.

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., 525 Garfield Bldg., Cleveland, O.

BLIZZARD—See Bridgeport Brass Co.

BOSS—See Cox Brass Mfg. Co.

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. "Stapley," "Æolus," "Blizzard," "Atlas." (See page 337.)

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

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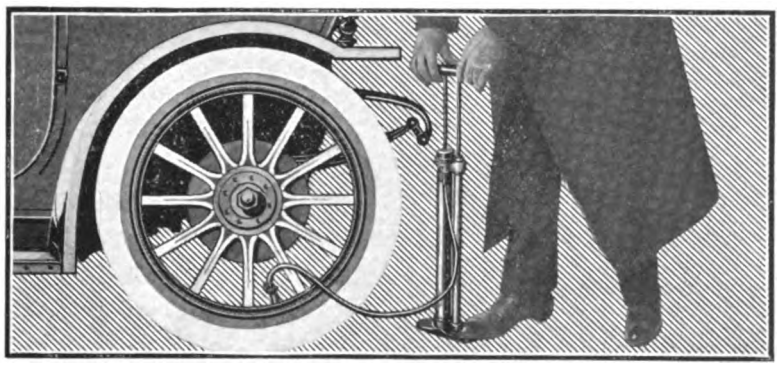
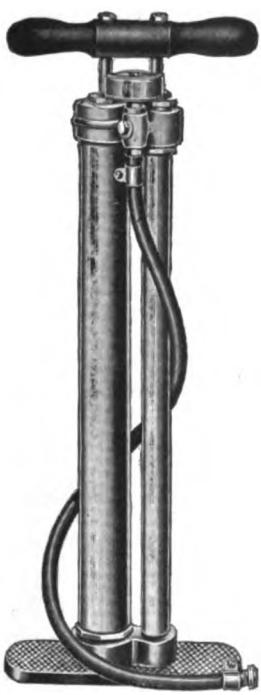


ATLAS AUTO • PUMP •

MADE BY BRIDGEPORT BRASS CO.



Far superior in design, appearance and efficiency to any pump on the market. It's strong, powerful, does its work quickly and easily. Can't rust. Withstands the most severe usage.

ATLAS is a double cylinder, compound pump with open top. No complicated parts. No intricate valve mechanism. Seamless brass tube cylinders—non-leakable joints. Fitted with specially treated brackets--practically indestructible. Inflates upward or downward stroke. Beautifully finished.

NEW PRESSURE GAUGE

Most perfect pressure gauge on the market—tells pressure within 3 per cent.—we guarantee this. If your dealer doesn't carry the ATLAS, we send it prepaid on receipt of price.

Price, without Gauge, $4.00
Price, with Gauge, - 6.00

Bridgeport Brass Co.

126 Crescent Ave., BRIDGEPORT, CONN.

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PUMPS (Continued)

HAND TIRE PUMPS (Continued)

CLIMAX Specialty Co., Seneca Falls, N. Y.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COE-STAPLEY Co., Bridgeport, Conn. "Rex."

COLUMBIA—See Judd & Leland Mfg. Co.

COX Brass Mfg. Co., Albany, N. Y. "Boss," "Handy," "Reliable."

CYCLONE—See Judd & Leland Mfg. Co.

EUREKA—See Judd & Leland Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich. (See page 543.)

GOULDS Mfg. Co., Seneca Falls, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANDY—See Cox Brass Mfg. Co.

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn. (See page 673.)

HILL—See Judd & Leland Mfg. Co.

IDEAL—See Noera Mfg. Co.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. "Wixon." (See page 153.)

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Eureka," "Columbia," "Tornado," "Cyclone," "Hill," "Victor." (See page 339.)

KELLOGG Mfg. Co., E. Main & Circle Sts., Rochester, N. Y.

KEYSTONE Novelty Co., Columbia, Pa. "Myers Aertite." (See page 247.)

MERRY, Edward, 395 Allen St., Springfield, Mass.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.)

MYERS—See Keystone Novelty Co.

NOERA Mfg. Co., Waterbury, Conn. "Red Devil." "Ideal." (See page 635.)

PITNER Pump Co., 30 W. Michigan St., Chicago, Ill. (See page 635.)

RED DEVIL—See Noera Mfg. Co.

RELIABLE—See Cox Brass Mfg. Co.

REX—See Coe-Stapley Co.

SHAWVER Co., Springfield, O. "Springfield."

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

SPRINGFIELD—See Shawver Co.

STANDARD Sheet Metal Co., Passaic, N. J.

STAPLEY—See Bridgeport Brass Co.

STAR Brass Works, 123 N. Jefferson St., Chicago, Ill. "Binks."

TORNADO—See Judd & Leland Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

VICTOR—See Judd & Leland Mfg. Co.

WIXON—See Imperial Brass Mfg. Co.

OIL PUMPS

(See Lubricators)

POWER BILGE PUMPS

GREEN Bay Machine Co., 1241-43 St. Clair St., Green Bay, Wis.

LOBEE Pump & Machinery Co., 140-52 Terrace St., Buffalo, N. Y.

NEW London Motor Co., Pequot Ave., New Haven, Conn. "Pequot."

PEQUOT—See New London Motor Co.

STEAM AIR PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich.

UNION Steam Pump Co., Battle Creek, Mich.

STEAM BOILER FEED PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich.

OFELDT & Sons, August, Valley Stream, N. Y.

UNION Steam Pump Co., Battle Creek, Mich

WATER CIRCULATING PUMPS

AUTO Parts Mfg. Co., Detroit, Mich. (See page 773.)

AUTO & Power Appliance Co., The Arcade, Cleveland, O.

BLACKMER Rotary Pump, Power & Mfg. Co., Petoskey, Mich.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

CIRCULATION Pump Co., 1777 Broadway, New York, N. Y. "Gunther."

DOEHLER Die Casting Co., Court & Ninth Sts., Brooklyn, N. Y. (See page 135.)

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

GUNTHER—See Circulation Pump Co.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

KINNEY Mfg. Co., 100 Boylston St., Boston, Mass. (See page 339.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis. (See page 503.)

LOBEE Pump & Machinery Co., 140-52 Terrace, Buffalo, N. Y.

McCORD Mfg. Co., Detroit, Mich. (See pages 58 and 59.)

OBERDORFER Brass Co., M. L., 808 E. Water St., Syracuse, N. Y. (See page 459.)

PURIFIERS

ACETYLENE GAS PURIFIERS

ASHTON & Dorr Co., W. E., 2011 Walnut St., Philadelphia, Pa.

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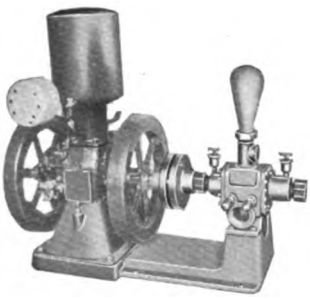
WE MANUFACTURE FOR ALL PURPOSES

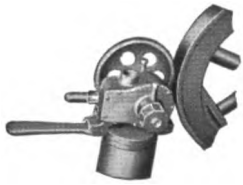
PUMPS

Automobile Circulating Pumps, Gas Engine Pumping Outfits, Electric Pumping Outfits, Gas Engine Circulating Pumps, Bilge Pumps hand or power driven. Complete Spraying Outfits.



Gas Engine Pumping Outfit

If you are having pump troubles write us and we can help you out.



Bilge Pump

KINNEY MANUFACTURING CO.

100 Boylston Street BOSTON, MASS.

VICTOR

A Garage Pump

Inflates a tire with 30 strokes, others require 100 strokes. Takes the place of an expensive Power Compressor at 1-15th the cost.

Made extra strong to stand hard knocks and packed with Metallic Tanned Packings **guaranteed** for a year.

HILL

Compound Pump has **cylinders 1½″ longer,** yet is the same length over all as **competitors.** Consequently it inflates quicker and easier yet fits all tool boxe.

EUREKA TRIPLEX

As is well known is the **easiest working Pump made.**

Manufactured by

JUDD & LELAND MFG. CO.

CLIFTON SPRINGS, N. Y.

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PURIFIERS (Continued)

ACETYLENE GAS PURIFIERS (Continued)

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. (See page 257.)

WALD Mfg. Co., 317 N. Eighth St., Sheboygan, Wis.

PUSHES

FOOT PUSHES

(For ringing electric bells)

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

PUTTY

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ALLENTOWN Mfg. Co., 26 S. Sixth St., Allentown, Pa.

BAKER, Wm. T., 228-32 Suydam Ave., Jersey City, N. J. "Ordamor."

BELKNAP, McSherry & Moran Co., E. S., 5 Ainslie St., Brooklyn, N. Y.

BRIGGS & Co., John, 45 Purchase St., Boston, Mass.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

DEVOE & C. T. Reynolds Co., F. W., 101 Fulton St., New York, N. Y.

DICKS & Wiggim Co., 28 N. Canal St., Dayton, O.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

ORDAMOR—See Baker, Wm. T.

WILHELM Co., A., Reading, Pa.

RACES

BALL RACES

(See Cups, Ball)

RACKS

HAT RACKS

BRIDGEPORT Coach Lace Co., 805 Wood Ave., Bridgeport, Conn.

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia." (See page 439.)

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

TRUNK RACKS

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

CHESTER Engineering & Machine Co., Chester, Pa. "P. & S." (See page 293.)

CONNECTICUT Steel & Wire Co., 55-61 Allyn St., Hartford, Conn. "Standard."

CRADLE—See Motor Car Supply Co.

HIGHTON & Sons Co., Wm., Nashua, N. H.

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

MASON, John A., 312 Washington St., Newton, Mass.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill. "Cradle."

NOONAN Tool & Machine Works, 105 E. Dow St., Rome, N. Y.

OMEGA Separator Co., Lansing, Mich. (See page 605.)

P & S—See Chester Engineering & Machine Co.

POLLARD Auto Co., Nashua, N. H.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

STANDARD—See Connecticut Steel & Wire Co.

STANDARD Auto Specialty Co., 57 Boerum St., Brooklyn, N. Y.

STANHOPE Forge & Machine Works, 27 Stanhope St., Boston, Mass.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

WESTERN Auto Top & Supply Co., 1122-26 E. 15th St., Kansas City, Mo. (See page 437.)

WILCOX Mfg. Co., Aurora, Ill.

RADIATORS

AEROPLANE RADIATORS

AERIAL Navigation Co. of America, Girard, Kans. "Call."

CALL—See Aerial Navigation Co.

EL ARCO Radiator Co., 6-10 E. 31st St., New York, N. Y.

LIVINGSTON Radiator & Mfg. Co., 136-46 W. 52d St., New York, N. Y. (See page 345.)

PEERLESS Automobile Radiator Co., 19 Marentette St., Detroit, Mich.

WATER COOLERS OR RADIATORS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.

AUTOMOBILE Supply Co., 547 W. 59th St., New York, N. Y. "Beck." (See page 673.)

Complete Index to Classification appears on Pages 8 to 22.

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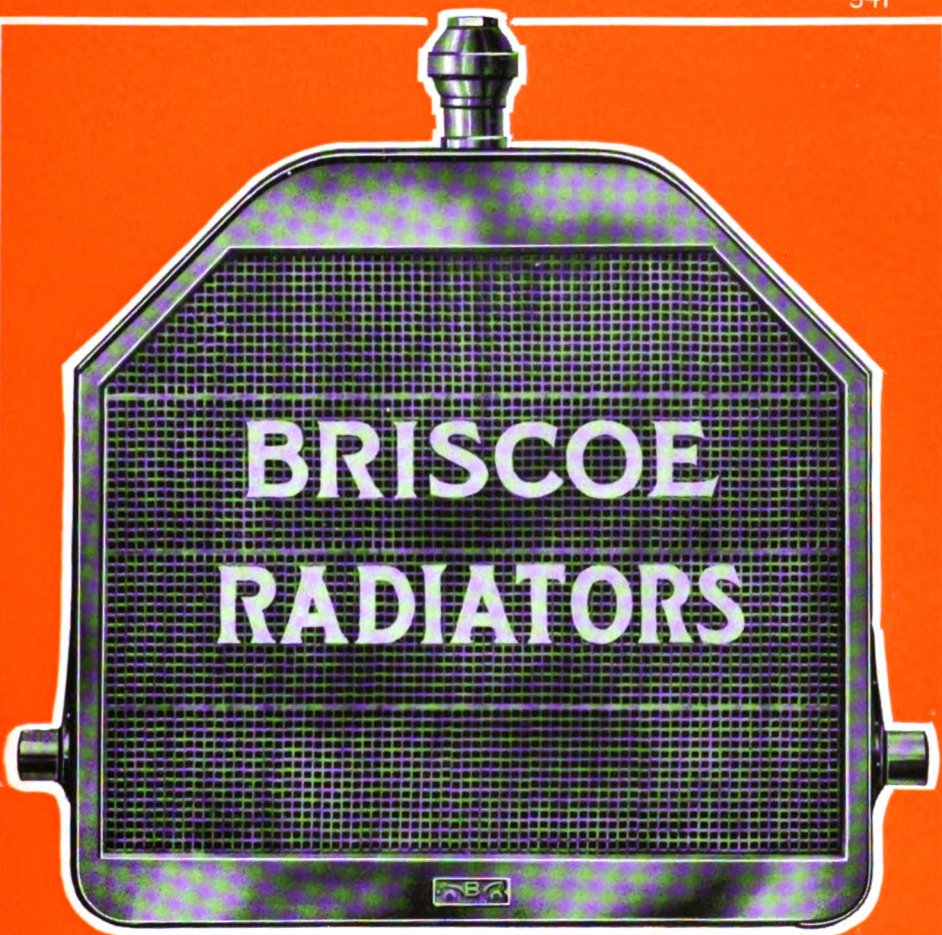

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The Mercedes Type of Radiator illustrated on this page is only one of the many types we manufacture.

"Quality" is the one great reason why we are furnishing Radiators, Hoods, Fenders and other parts for many of the best cars built in the U. S.

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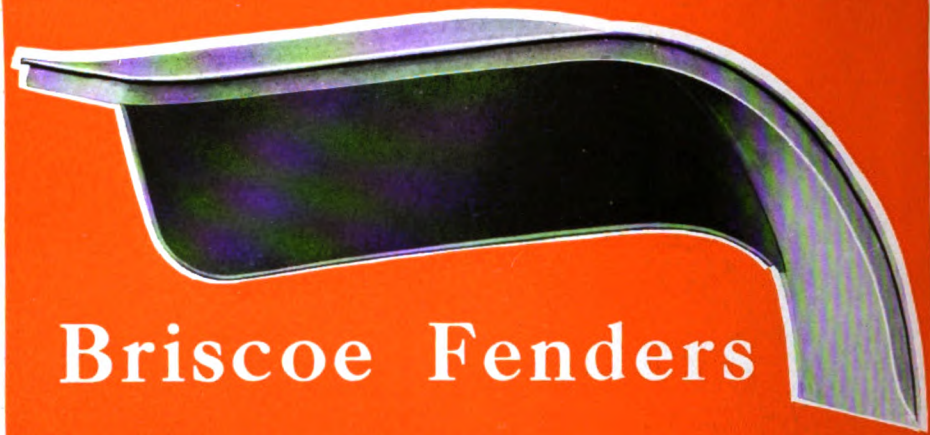

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are properly formed and constructed as well as experience, equipment, and money can make them.

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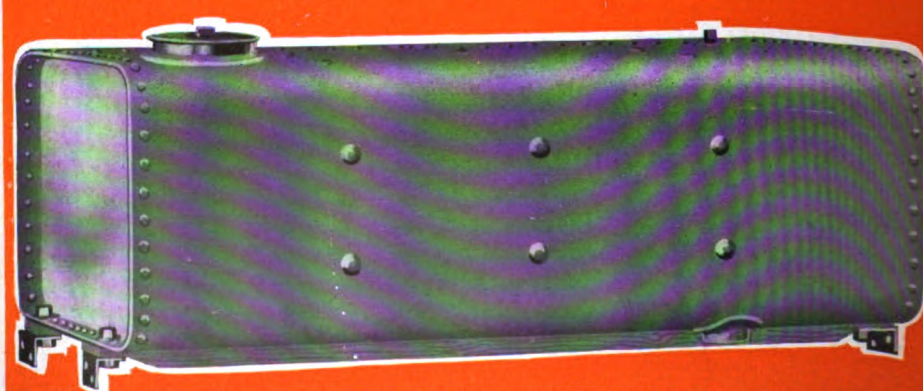
General Offices, DETROIT Factories, DETROIT and NEWARK, N. J.



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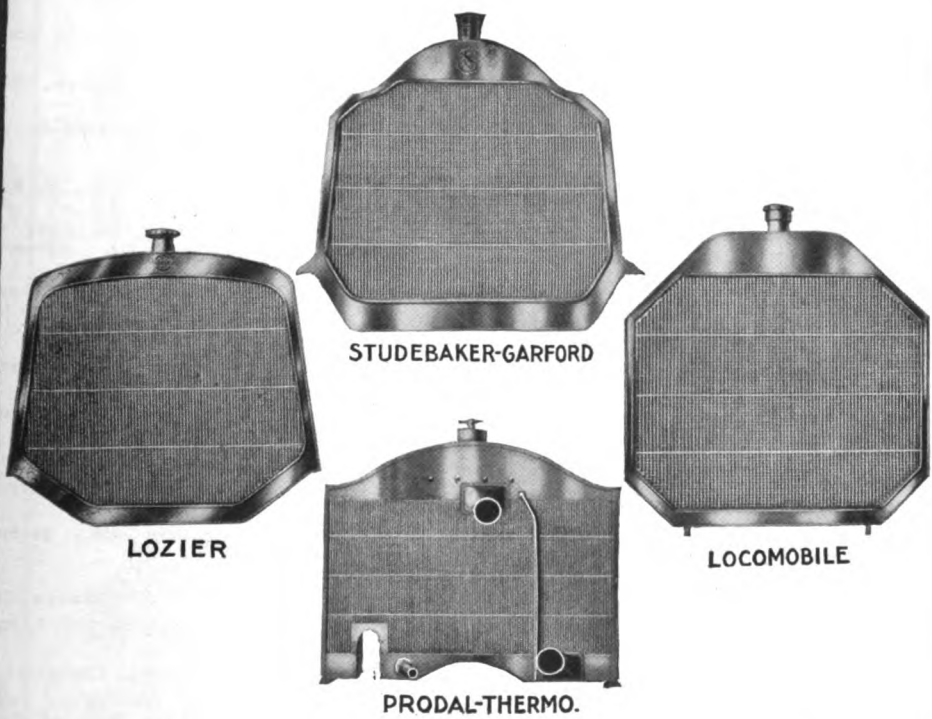
THE A-Z CO.
NEW YORK



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Greatest efficiency—direct water channels —ease of repair—and ease of cleaning

New Radiator catalog just ready. Will be pleased to send you a copy

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RADIATORS (Continued)

WATER COOLERS OR RADIATORS (Continued)

BECK—See Automobile Supply Co.

BECKER, Wm., 153 Second St., Hoboken, N. J.

BEHRINGER Radiator Works, Ticonderoga, N. Y.
(See page 745.)

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

BUSH Mfg. Co., Hartford, Conn.
(See page 697.)

CHANDLER Radiator Co., 177 High St., E., Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

EL ARCO Radiator Co., 6-10 E. 81st St., New York, N. Y.

ELECTROLYTIC Products Co., 707 D. S. Morgan Bldg., Buffalo, N. Y.

ENGLISH & Mersick Mfg. Co., New Haven, Conn.

FEDDERS Mfg. Works, 55 Tonawanda St., Buffalo, N. Y.
(See page 181.)

HARRISON Radiator Co., Lockport, N. Y.
(See page 773.)

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KELLS Mfg. Co., W. J., 726-28 11th Ave., New York, N. Y.
(See page 383.)

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 383.)

KINWOOD—See Kinsey Mfg. Co.

KURTZNER Radiator Co., 416 Prospect Ave., N. W., Cleveland, O.

LIVINGSTON Radiator & Mfg. Co., 136-46 W. 52d St., New York, N. Y.
(See page 345.)

LOCKPORT Stamping Co., Findlay, O.

LONG Mfg. Co., Chicago, Ill.
(See page 697.)

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

MAYO Radiator Co., New Haven, Conn.
(See page 233.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

NOYE Mfg. Co., 50 Lakeview Ave., Buffalo, N. Y.
(See page 514.)

PEERLESS Automobile Radiator Co., 19 Marantette St., Detroit, Mich.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

ROME-TURNEY Radiator Co., Rome, N. Y.

TAKE-APART-RADIATOR Co., 804 E. Washington St., Greensburg, Ind. "T-A-R-Co."

T-A-R-CO.—See Take-Apart-Radiator Co.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WRIGHT Cooler & Hood Mfg. Co., Muskegon, Mich.

RAILS

ROBE OR COAT RAILS

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AREMCO—See Rothstein Mfg. Co.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich.
(See page 351.)

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

AUTO Specialty Co., 89 Pearl St., Boston, Mass.

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy."
(See page 61.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.
(See page 351.)

COLUMBUS Auto Brass Co., Columbus, O.
(See page 255.)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

COX Brass Mfg. Co., Albany, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 635.)

ENGLISH & Mersick Co., New Haven, Conn.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Ideal."
(See page 283.)

HANDY—See Chicago Electric Mfg. Co.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IDEAL—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

MASON, John A., 812 Washington St., Newton, Mass.

MEDINA Machine & Stamping Co., Medina, N. Y.

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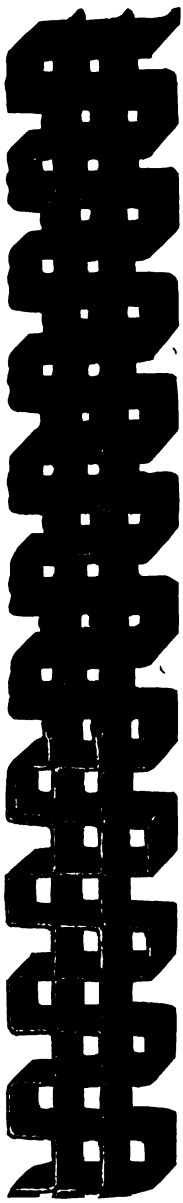
CROSS SECTIONAL VIEW

EXTERIOR VIEW



Note circulation of water in horizontal as well as vertical passages

Note sharp edges of our patented lap seam tubes

DO YOU REALIZE THAT PROPER COOLING MEANS

MORE { Miles, Speed, Efficiency } LESS { Gasoline, Oil, Wear }

Consequently Lower Cost and Longer Life

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and are the perfection of efficiency and construction designed on scientific principles.

Vertical Tubes. Square Corrugations. Lapped Seams. Long Water Channels. Equal Circulation through all Tubes. Entire Radiating Surface in Direct Contact with Circulating Water. Not an imitation of the square tube with dead Water in the Horizontal Passages, but Active Circulation, Adding 100%. Sharp Edges to Air Passages. Only 1/6 of Frontal Area Offered to Wind Resistance, not One-half.

Other Important Features Are:

1st—The patented vertical tubes with horizontal and vertical runs (*see marginal cut*), a construction giving the highest efficiency, but difficult to recognize for their external appearance.

2d—The patented, lapped, seamed, swaged edges of these tubes (*see marginal cut*), which result in thin edges to the square air ducts and reduce the wind resistance area to only one-sixth the total frontal area.

Radiators with thin-edged air ducts closely resembling the Livingston Radiators in appearance and external design, but possessing none of their distinctive and important structural features, are now on the market. Intending purchasers of Radiators are advised to make themselves thoroughly acquainted with interior construction as well as exterior appearance.

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RAILS (Continued)

ROBE OR COAT RAILS (Continued)

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium."
(See page 615.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MURDOCK Co., Jas., Jr., 116 Opera Place, Cincinnati, O.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn.

NOVELTY Mfg. Co., Waterbury, Conn

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

RADIUM—See Milwaukee Auto Specialty Co.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.
(See page 351.)

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

SEARLS Mfg. Co., 27 Mulberry St., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING—See Auto Accessories Mfg. Co.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

UNION Brass Works, 355-63 Harper Ave., Detroit, Mich.

VULCAN Mfg. Co., 1920 W. Kinzie St., Chicago, Ill.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

RAFTS

LIFE RAFTS AND BOATS

RIPPLEY Steel Boat Co., Grafton, Ill.

THOMPSON Boat & Pattern Works, H. F., Decorah, Iowa.

RANGES

GALLEY RANGES

(See Stoves, Coal)

RECORDERS

VEHICLE MOVEMENT RECORDERS

(For recording time vehicle is used)

AUTOMOBILE Protection Co., 322 Hudson St., New York, N. Y. "Watch Dog."

BAUMGAERTNER-PATRICK Co., Madison Ave. & 34th St., New York, N. Y.

SEARS-CROSS Co., 685 11th Ave., New York, N. Y.

WATCH DOG—See Automobile Protection Co.

RECTIFIERS

ALTERNATING CURRENT RECTIFIERS

AMERICAN Battery Co., 1132-34 Fulton St., Chicago, Ill.

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill., "Johns."

AUTO & Supply Mfg. Co., 2366 Woodhill Rd., Cleveland, O. "Simplicity."

COMO Electrical Co., Spring Lake, N. J "Hickley."

ELECTRIC Economy Co., 64 Warren St. (Roxbury), Boston, Mass.
(See page 347.)

ELECTRIC Products Co., Chandler Bldg., Atlanta, Ga. "Wotton."

GENERAL Electric Co., Schenectady, N. Y.

HICKLEY—See Como Electrical Co.

JOHNS—See Ashbrook, J. F.

MURPHY Electricity Rectifier Co., 200 South Ave., Rochester, N. Y.

SIMPLICITY—See Auto & Supply Mfg. Co.

SIRCH Electrical & Testing Laboratories, Los Angeles, Cal.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WOTTON—See Electric Products Co.

REFLECTORS

MIRROR LAMP REFLECTORS

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

BAUSCH & Lomb Optical Co., Rochester, N. Y.

FRY Glass Co., H. C., Rochester, Pa.

LANCASTER Lens Co., Lancaster, O.
(See page 347.)

MACBETH-EVANS Glass Co., Wabash Terminal Bldg., Pittsburg, Pa.

MATISSE, C. & A., 543-49 E. 116th St., New York, N. Y.
(See page 347.)

UNITED States Optical Glass Co., Follansbee, W. Va.

REFRIGERATORS

MOTOR BOAT REFRIGERATORS AND ICE CHESTS

BALDWIN Refrigerator Co., Burlington, Vt.

BELDING-HALL Co., Belding, Mich.

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REFRIGERATORS (Continued)

MOTOR BOAT REFRIGERATORS AND ICE CHESTS (Continued)

CHALLENGE Refrigerator Co., Grand Haven, Mich.

HEINZ & Munschauer, Buffalo, N. Y.

INDIANA Mfg. Co., Peru, Ind.

LORILLARD Refrigerator Co., 25-27 W. 32nd St., New York, N. Y.

McCRAY Refrigerator Co., Kendallville, Ind.

MACE & Co., L. H., 111-17 E. Houston St., New York, N. Y.

RANNEY Refrigerator Co., Greenville, Mich.

VOGT Mfg. Co., Peter A., Evans & Norton Sts., Buffalo, N. Y.

WHITE Enamel Refrigerator Co., St. Paul, Minn.

REGULATORS

FUEL FEED REGULATORS

OFELDT & Sons, F. W., Nyack, N. Y.

WALKER Mfg. Co., E. C., Jackson & Lampton Sts., Louisville, Ky.

TANK PRESSURE REGULATORS

(For regulating the exhaust pressure on gasoline or oil tanks)

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

LOCKE Regulator Co., 76 North St., Salem, Mass.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

WATER LEVEL REGULATORS

LANE Motor Vehicle Co., Poughkeepsie, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

WALKER Mfg. Co., E. C., Jackson & Lampton Sts. Louisville, Ky.

REMOVERS

CARBON REMOVERS

(See also Compounds, Cylinder Cleaning; also Scrapers, Carbon)

MICHENER, E. S., 80 Washington St., New Castle, Pa.

PAINT AND VARNISH REMOVERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

AD-EL-ITE—See Adams & Elting Co., Chicago, Ill.

ADAMS & Elting Co., Chicago, Ill. "Ad-el-ite."

ALBANY Chemical Co., Albany, N. Y.

BRADLEY & Vrooman Co., Chicago, Ill. 'Crown."

CHALMERS Chemical Co., Dedham, Mass. "Phenoid."

CROWN—See Bradley & Vrooman Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers Abluent."

EBERSON Paint Co., St. Louis, Mo.

ECLIPSE—See Gould & Cutler.

ENTERPRISE Paint Mfg. Co., Peoria & Van Buren Sts., Chicago, Ill. "Noxall."

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

GILLESPIE & Son, Chas. H., 19 Dey St., Jersey City, N. J. "Monarch."

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GOULD & Cutler, 105 North St., Boston, Mass. "Eclipse."

HARRISON Bros. & Co., 35th St. & Grays Ferry Rd., Philadelphia, Pa.

HEATH & Milligan Mfg. Co., 170-72 Randolph St., Chicago, Ill.

LAWRENCE & Co., W. W., Pittsburg, Pa.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MICHIGAN Paint Co., Flint, Mich.

MONARCH—See Gillespie & Son.

NOXALL—See Enterprise Paint Mfg. Co.

PALMER-PRICE Co., Newark, N. J.

PARROTT Varnish Co., Bridgeport, Conn. (See page 727.)

PENINSULAR Paint & Varnish Co., Detroit, Mich.

PHENOID—See Chalmers Chemical Co.

PRINCE Paint Co., Jas. H., Boston, Mass.

ROGERS-ABLUENT—See Detroit White Lead Works.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill.

REPAIRERS

SPRING REPAIRERS

(See Clamps, Spring Repair)

RESTS

BOW RESTS

BARBEE Mfg. Co., 1401-05 W. Ninth St., Cleveland, O.

CRANDAL, Stone & Co., Binghamton, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

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RESTS (Continued)

BOW RESTS (Continued)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NON-CORROSIVE Metal Co., Watertown, Mass.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 133.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

FOOT RESTS

(See also Hassocks)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AREMCO—See Rothstein Mfg. Co.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich.
(See page 351.)

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

AUTO Specialty Co., 89 Pearl St., Boston, Mass.

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O.

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy."
(See page 61.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.
(See page 351.)

COLUMBUS Auto Brass Co., Columbus, O.
(See page 255.)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

COX Brass Mfg. Co., Albany, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 635.)

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FRANKFORT Brass Mfg. Co., Frankfort, Ind.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Ideal."
(See page 283.)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HANDY—See Chicago Electric Mfg. Co.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IDEAL—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

MEDINA Machine & Stamping Co., Medina, N. Y.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y.

NON-CORROSIVE Metal Co., Watertown, Mass.

NORTH & Judd Mfg. Co., New Britain, Conn.

NOVELTY Mfg. Co., Waterbury, Conn. "Waterbury."

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.
(See page 351.)

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SEARLS Mfg. Co., 27 Mulberry St., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

UNION Brass Works, 355-63 Harper Ave., Detroit, Mich.

VULCAN Mfg. Co., 1920 W. Kinzie St., Chicago, Ill.

WATERBURY—See Novelty Mfg. Co.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

RETAINERS

BALL RETAINERS

BOSSERT Co., Utica, N. Y.
(See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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RETAINERS (Continued)

BALL RETAINERS (Continued)

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

STAR Ball Retainer Co., Lancaster, Pa.
(See page 113.)

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

RHEOSTATS

BATTERY CHARGING RHEOSTATS

ALLEN-BRADLEY—See American Electric Fuse Co.

AMERICAN Electric Fuse Co., Muskegon, Mich. "Allen-Bradley."
(See page 745.)

CLARK Electric Meter Co., 126-28 S. Clinton St., Chicago, Ill.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 679.)

GENERAL Electric Co., Schenectady, N. Y.

KESTER Electric Co., 1000-04 S. 14th St., Terre Haute, Ind.

LEONARD Electric Co., Ward, Bronxville, N. Y.

NATIONAL Electric Controller Co., 1110-12 W. Lake St., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

RIMS

QUICK DETACHABLE RIMS

MOTT Wheel Works, Utica, N. Y.
(See page 699.)

NEWMASTIC Tire Co., 68th St. & Broadway, New York, N. Y. "Parker."

PARKER—See Newmastic Tire Co.

REPUBLIC Rubber Co., Youngstown, O.

STANDARD Welding Co., Cleveland, O.
(See page 603.)

UNITED Rim Co., Akron, O.

WESTON-MOTT Co., Flint, Mich.
(See page 65.)

REMOVABLE OR DEMOUNTABLE RIMS

ALPHA—See Blauw, Julius.

AMERICAN Rim Co., 248 W. 54th St., New York, N. Y. "Lambert."
(See page 478.)

BAKER—See Universal Rim Co.

BLAUW, Julius, 47 W. 34th St., New York, N. Y. "Alpha."

BOOTH Demountable Rim Co., 8410 Lake Ave., Cleveland, O.

BUSHEY Demountable Rim Co., Thoroughfare Bldg., New York, N. Y.

BYAM, Eber C., 45 Lake St., Chicago, Ill.

CONTINENTAL Caoutchouc Co., 1788-90 Broadway, New York, N. Y.

DENEGRE Demountable Rim Co., Birmingham, Ala.
(See page 353.)

DORIAN Remountable Rim Co., 1802 Broadway, New York, N. Y.
(See page opposite title page.)

DOW Rim Co., 1783 Broadway, New York, N. Y.

EMPIRE Tire Co., Mulberry St. and Clinton Ave., Trenton, N. J.

FIRESTONE Tire & Rubber Co., Akron, O.
(See page 431.)

FISK Rubber Co., Chicopee Falls, Mass.

HARTFORD Rubber Works Co., Hartford, Conn. "Whittlesey."

HEALY Rim Co., 285-87 Jay St., Brooklyn, N. Y.

HOWARD Demountable Rim Co., Trenton, N. J.

JORDAN Demountable Rim Co., 733 Boylston St., Boston, Mass.
(See page 773.)

LAMBERT—See American Rim Co.

MICHELIN Tire Co., Milltown, N. J.

MIDGLEY—See Ohio Tire Co.

MOTT Wheel Works, Utica, N. Y.
(See page 699.)

O'GORMAN-YOUNIE Co., Portland, Ore. "Younie."

OHIO Tire Co., Columbus, O. **"Midgley."**

SCOTT Demountable Rim Co., 6 E. German St., Baltimore, Md.

STANDARD Welding Co., Cleveland, O.
(See page 603.)

UNITED Rim Co., Akron, O.

UNIVERSAL Rim Co., 1303 Michigan Ave., Chicago, Ill. "Baker."

WESTON-MOTT Co., Flint, Mich.
(See page 65.)

WHITTLESEY—See Hartford Rubber Works Co.

YOUNIE—See O'Gorman-Younie Co.

RUBBER STEERING-WHEEL RIMS

DIAMOND Rubber Co., Akron, O.
(See page 139.)

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

STANDARD RIMS

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

MOTT Wheel Works, Utica, N. Y.
(See page 699.)

PEUGEOT Frères, 232 W. 58th St., New York, N. Y. (Importers.)

STANDARD Welding Co., Cleveland, O.
(See page 603.)

UNITED States Wheel & Rim Co., St. Anna, Ill.

WESTON-MOTT Co., Flint, Mich.
(See page 65.)

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RIMS (Continued)

STEEL MOTOR CYCLE BELT RIMS

STANDARD Welding Co., Cleveland, O (See page 603.)

UNITED States Wheel & Rim Co., St. Anne, Ill.

STEEL MOTOR CYCLE RIMS

MOTT Wheel Works, Utica, N. Y.

STANDARD Welding Co., Cleveland, O (See page 603.)

UNITED States Wheel & Rim Co., St. Anne, Ill.

WOOD RIMS OR FELLOES

AMERICAN Wood Rim Co., Onaway, Mich.

BREECE Mfg. Co., Portsmouth, O.

CRANE & MacMahon, 8-10 Bridge St., New York, N. Y. "Nut." "Star."

JONES & Co., Phineas, Newark, N. J. (See page 699.)

LEBZELTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

NUT—See Crane & MacMahon.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

STAR—See Crane & MacMahon.

STARR, D. H., Highland, N. Y.

TOLEDO Bending Co., Toledo, O. (See page 641.)

TUCKER Woodwork Co., Sidney, O.

VON Behren Mfg. Co., Oakley & Morgan Sts., Evansville, Ind.

YORK Bending Works, York, Pa.

WOOD STEERING WHEEL RIMS

ACME Veneer & Body Co., Rahway, N. J.

AMERICAN Wood Rim Co., Onaway, Mich.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

TUCKER Wood Work Co., Sidney, O.

RINGS

DUST RINGS

(See Washers, Felt)

PISTON RINGS

DUNHAM & Co., M. L., 1595 Broadway, New York, N. Y. "Wasson."

EVARTS Machine Co., 18 Hicks St., Hartford, Conn.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 313.)

TIPPETT Mfg. Co., 172-82 W. Locust St., Columbus, O. (See page 579.)

WAINWRIGHT & Son, W. W., 16th St. & Western Ave., Connersville, Ind.

WASSON—See Dunham & Co.

RIVETS

BRASS AND COPPER RIVETS

AMERICAN Screw Co., Providence, R. I. (See page 681.)

BLAKE & Johnson Co., Waterbury, Conn. (See page 367.)

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

COBB & Drew, Plymouth, Mass.

FALLS Rivet & Machine Co., Kent, Ohio.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y. (See page 355.)

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

PROGRESSIVE Mfg. Co., 41 Norwood St. Torrington, Conn.

ROME Brass & Copper Co., Rome, N. Y.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

TAUNTON Rivet Works, Taunton, Mass.

WATERBURY Brass Goods Corp., Washington Ave., Waterbury, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

COPPER RIVETS

(See Rivets, Brass)

IRON AND STEEL RIVETS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

COBB & Drew, Plymouth, Mass.

COLUMBIA Screw Co., 106th St. & Corliss Ave., Chicago, Ill.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet & Machine Co., Kent, Ohio.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAND Crossing Tack Co., Grand Crossing, Chicago, Ill.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y. (See page 355.)

HOOPES & Townsend Co., 1330 Buttonwood St., Philadelphia, Pa.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

LAMSON & Sessions Co., 2188 Scranton Road, Cleveland, O.

MICHIGAN Bolt & Nut Works, foot Meldrum Ave., Detroit, Mich.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

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RIVETS (Continued)

IRON AND STEEL RIVETS (Continued)

NEWARK Rivet Works, 262 Lafayette St., Newark, N. J.

PITTSBURG Rivet Co., 38th St. & Junction Ry., Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

TAUNTON Rivet Works, Taunton, Mass.

UPSON Nut Co., Unionville, Conn.

NON-SKID TIRE RIVETS

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

PLATINUM RIVETS

(See Platinum)

ROBES

AUTOMOBILE LAP ROBES

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AUTO Robe & Rubber Co., 13 E. 16th St., New York, N. Y.

AYRES & Sons, Wm., Cumberland & Third Sts., Philadelphia, Pa.
(See page 357.)

BALLARD & Co., J. O., Malone, N. Y.

BECKMAN Co., Cleveland, O.
(See page 357.)

BISHOP Co., J. H., Wyandotte, Mich.

BURLINGTON Blanket Co., Burlington, Wis. "Sho-Fur."
(See page 359.)

CHASE & Co., L. C., Boston, Mass.
(See page 149.)

CHICAGO Auto Robe Supply Co., 119-23 S. Market St., Chicago, Ill.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

CURTIS & Von Bernuth Mfg. Co., 38 W. Broadway, New York, N. Y.

DRAPER Bros., Canton, Mass.

FOREST Fur Co., 118½ E. 28th St., New York, N. Y.

GAUSLER & Starr Co., 249 Market St., Philadelphia, Pa.

GORDON—See Vehicle Apron & Hood Co.

MID-WEST Motor Supply Co., 554 W. Jackson Blvd., Chicago, Ill.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

NATIONAL Casket Co., 381-85 Wabash Ave., Chicago, Ill.

PONTOOSUC Woolen Mfg. Co., Pittsfield, Mass.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

RILEY & Co., Wm. B., 228 Chestnut St., Philadelphia, Pa.

SCANDINAVIAN Fur & Leather Co., 16 W. 33rd St., New York, N. Y.

SHO-FUR—See Burlington Blanket Co.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

WALLACE Co., Hugh, Boulevard & Orleans St., Detroit, Mich.

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill.
(See page 459.)

WILD & Co., Jos., 366-70 Fifth Ave., New York, N. Y.

RODS

ADJUSTABLE VALVE LIFT RODS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

APCO—See Auto Parts Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

BRIDGEPORT—See Lyford Bros.

LYFORD Bros., 42 Beach St., Bridgeport, Conn. "Bridgeport."

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(See Aluminum, Sheet)

BRASS RODS

(See Brass, Sheet)

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(See pages 191 and 192.)

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 601.)

KRUPP—See Prosser & Son.

McCUE Co., Hartford, Conn.
(See pages 71 and 291.)

OBENBERGER Drop Forge Co., 220 Lake St., Milwaukee, Wis.

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 607.)

TINDEL-MORRIS Co., Eddystone, Pa.

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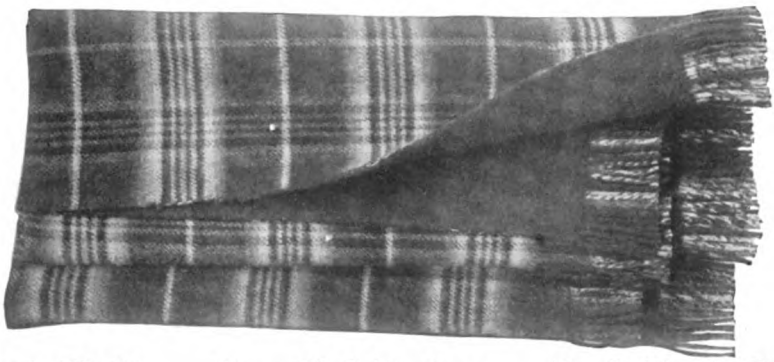

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(See Brass, Sheet)

FIBRE RODS

(See Fibre, Hard)

RUBBER RODS

(See Rubber, Hard)

STEEL RODS

(See Steel)

ROLLERS

CURTAIN ROLLERS

CAREY & Co., 241-45 Arch St., Philadelphia, Pa. "Edw. Reukauf."

COWLES & Co., C., New Haven, Conn. (See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

EDW. REUKAUF—See Carey & Co.

LOCKWOOD Co., 84 Mechanic St., Newark, N. J.

SPRING Perch Co., 232 John St., Bridgeport, Conn.

ROPE

BRONZE WIRE ROPE OR CABLE

ELEPHANT—See Phosphor Bronze Smelting Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant." (See page 543.)

REEVES & Son, Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RIVERSIDE Metal Co., Riverside, N. J.

COTTON ROPE

HOLDEN, Jas., 559 Ridge St., Fall River, Mass.

HOOPER Sons Mfg. Co., Juniper & Cherry Sts., Philadelphia, Pa.

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

JACOBS-MILLER Co., 18 E. Fourth St., Cincinnati, O.

LAMBETH Rope Corp., New Bedford, Mass.

SAMSON Cordage Works, 88 Broad St., Boston, Mass.

SILVER Lake Co., 78 Chauncey St., Boston, Mass.

SMALL Bros., Fall River, Mass.

HEMP OR MANILA ROPE

COLUMBIAN Rope Co., Auburn, N. Y. "Eureka."

EUREKA—See Columbian Rope Co.

FITTER Co., Edwin H., Philadelphia, Pa.

HOOVEN & Allison Co., Xenia, O.

JACOBS-MILLER Co., 18 E. Fourth St., Cincinnati, O.

OVERMAN & Schrader Cordage Co., Covington, Ky.

PLYMOUTH Cordage Co. (N. Plymouth), Plymouth, Mass.

TUCKER & Carter Rope Co., 167 Maiden Lane, New York, N. Y.

WALL Rope Works, 56 South St., New York, N. Y.

WATERBURY Co., 80 South St., New York. N. Y.

WHITLOCK Cordage Co., 46 South St., New York, N. Y.

SPECIAL TILLER ROPE

EXCELSIOR—See Wright Wire Co.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

MACOMBER & Whyte Rope Co., 507-09 S. Clifton St., Chicago, Ill.

NEPTUNE—See Wright Wire Co.

ROEBLING'S Sons Co., John A., Trenton, N. J.

SAMSON Cardage Works, 88 Broad St., Boston, Mass.

SILVER Lake Co., 78 Chauncey St., Boston, Mass.

TUCKER & Carter Rope Co., 167 Maiden Lane, New York, N. Y.

WRIGHT Wire Co., Palmer, Mass. "Neptune." "Excelsior."

STEEL WIRE ROPE OR CABLE

AMERICAN Steel & Wire Co., Chicago, Ill. (See page 725.)

BRODERICK & Bascom Rope Co., 809 N. Main St., St. Louis, Mo.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

LESCHEN & Sons' Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

MACOMBER-WHYTE-MOON Co., 122 Centre St., New York, N. Y.

ROEBLINGS & Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

WASHBURN Wire Co., Phillipsdale, R. I.

WATERBURY Co., 80 South St., New York, N. Y.

WILLIAMSPORT Wire Rope Co., Williamsport, Pa.

WRIGHT Wire Co., Palmer, Mass.

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SHOTTER Co., S. P., Savannah, Ga.

STANDARD Naval Stores Co., Jacksonville, Fla.

STAR Rosin Co., Savannah, Ga.

RUBBER

HARD RUBBER

(Sheet, Rod and Tube)

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

DIAMOND Rubber Co., Akron, O. (See page 139.)

DICKINSON Mfg. Co., ft. of Mechanic St., Springfield, Mass. (See page 361.)

LUZERNE Rubber Co., Trenton, N. J.

MORGAN & Wright, Detroit, Mich.

SIEMON Hard Rubber Co., Bridgeport, Conn.

STOKES Rubber Co., Jos., Trenton, N. J.

VULCANIZED Rubber Co., 438 Broadway, New York, N. Y.

WILKIE Rubber Mfg. Co., Lynn, Mass.

SADDLES

MOTOR CYCLE SADDLES

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y. (See page 733.)

PERSONS Mfg. Co., 54-68 Bloomingdale Rd., Worcester, Mass.

TROXEL Mfg. Co., Elyria, O.

SAILS

BRIGGS & Beckman, 31-35 Commercial St., New Bedford, Mass.

GOSS Co., J. C., 10 Atwater St., E., Detroit, Mich.

HEMMENWAY & Son, 54-55 South St., New York, N. Y.

HOPKINS & Co., John C., 119 Chambers St., New York, N. Y.

PEASE Co., L. F., Providence, R. I.

RATSEY & Lapthorn, City Island, N. Y.

ROBINSON & Co., G. W., City Island, N. Y.

SIEDER Mfg. Co., 176-78 Jefferson Ave., Detroit, Mich.

THOMAS & Co., Wm. E., 42 South St., New York, N. Y.

VANDERHERCHENS Sons, 7 N. Water St., Philadelphia, Pa.

WEEKS-HOWE-EMERSON Co., 51 Market St., San Francisco, Cal.

WILSON & Silsby, Rowes Wharf, Boston, Mass.

SCOOPS

AIR SCOOPS

AMERICAN Marine Lamp Co., 261 Pearl St., New York, N. Y.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

SCRAPERS

BOAT SCRAPERS

BRADLEY'S Sons, G. W., Westport, Conn.

MACK & Co., 18 Browns Race, Rochester, N. Y.

MARINE Hardware & Equipment Co. (S. Portland), Portland, Me.

VAUGHN & Bushnell Mfg. Co., 2114-38 Carroll Ave., Chicago, Ill.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

CARBON SCRAPERS

B & R—See Beckley-Ralston Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "B. & R." (See page 159.)

BRAUNSDORF-MUELLER Co., 1091-99 E. Grand St., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

MOUND Tool & Scraper Co., 708 Howard St., St. Louis, Mo. (See page 481.)

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

SCREENS

HORN SCREENS

AUTOMOBILE Supply Mfg. Co., 220-22 Taaffe Pl., Brooklyn, N. Y. (See page 241.)

LOMBARDI Motor Co., Derby, Conn.

STANDARD Metal Mfg. Co., Chestnut, Jefferson & Malvern Sts., Newark, N. J. (See page 775.)

PORT LIGHT SCREENS

DIEM, Gus A., 20 Fulton St., New York, N. Y.

DURKEE & Co., Chas. D., 2 South St., New York, N. Y.

SCREW-EYES

BRASS AND IRON SCREW-EYES

BROOKS & Sons, M. S., Chester, Conn.

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JENCKES Mfg. Co., E., Worcester, Mass.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

SCREWS

CAP AND SET SCREWS

ANTHONY Screw Co., 330 Chandler St., Worcester, Mass.

CHICAGO Screw Co., 1026 Homan Ave., Chicago, Ill.

CINCINNATI Screw & Tap Co., Twightwee, O.

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 367.)

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

DETROIT Screw Works, Detroit, Mich.

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

ELECTRIC Welding Products Co., Cleveland, O.
(See page 463.)

FERRY Cap & Set Screw Co., 2151 Scranton Road, Pawtucket, R. I.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

KIRK-LATTY Mfg. Co., W. Madison Ave. & N. Y. C. Ry., Cleveland, O.

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 365.)

NATIONAL Screw & Tack Co., Stanton Ave., S. E. & C. & P. Ry., Cleveland, O.

NATIONAL Sewing Machine Co., Belvidere, Ill.

NEW Haven Machine Screw Co., 195 Saltonstall Ave., New Haven, Conn.

NIAGARA Screw Co., 20 Lock St., Buffalo, N. Y.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain, & Canton Aves., Detroit, Mich.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

ST. Louis Screw Co., Clarence & Bulwer Aves, St. Louis, Mo.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

SCREW Machine Products Co., Thurbers Ave. & Eddy St., Providence, R. I.

SHIMER & Sons, Samuel J., Milton, Pa.
(See page 487.)

UNIVERSAL Machine Screw Co., 306 Windsor St., Hartford, Conn.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., Elyria, O.
(See page 365.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

COACH AND LAG SCREWS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 367.)

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

NEW Castle Forge & Bolt Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

RHODE Island Tool Co., Providence, R. I.

SCRANTON Bolt & Nut Co., Scranton, Pa.

LAG SCREWS

(See Screws, Coach and Lag)

MACHINE SCREWS

AMERICAN Screw Co., Providence, R. I.
(See page 681.)

ATLAS Bolt & Screw Co., 1239 Marquette Rd., Cleveland, O.

CHICAGO Nut Co., 617-31 W. Jackson Blvd., Chicago, Ill.

COLUMBIA Screw Co., 106th St. & Corliss Ave., Chicago, Ill.

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

DETROIT Screw Works, Detroit, Mich.
(See page 739.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HUBBELL, Harvey, Bridgeport, Conn.

INTERNATIONAL Machine Screw Co., Springfield, Mass.

KIRK-LATTY Mfg. Co., W. Madison Ave. & N. Y. C. Ry., Cleveland, O.

MICHIGAN Screw Co., Lansing, Mich.

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 365.)

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

NEW Haven Machine Screw Co., 195 Saltonstall Ave., New Haven, Conn.

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Motor Specialties Co.

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Boston, Mass.

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THE FAMOUS

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AUTO-LIGHTER SYSTEMS

for automatic ignition and control of acetylene head-lights; the kind having single lever control of spark and gas.

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Gas - Driven Power Pumps

for inflating tires. The only tire pump which is always ready for work without attaching to a moving part of the engine. Fresh air only.

80% SAVED IN THE OPERATION OF YOUR AUTOMOBILE

headlights by using the Elliott Storage Carbide-Feed Generator. It has all of the advantages of the gas-tank. It cost 20% less to install and 80% less to operate; gas always ready for instant use; additional gas instantly generated by automatic mechanism controlled by the amount of gas consumed; lights are always steady.

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SCREWS (Continued)

MACHINE SCREWS (Continued)

PROGRESSIVE Mfg. Co., 41 Norwood St., Torrington, Conn.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

ST. Louis Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

SCREW Machine Products Corp., Thurbers Ave. & Eddy St., Providence, R. I.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., Elyria, O.
(See page 365.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

SET SCREWS

(See Screws, Cap and Set)

THUMBSCREWS

BILLINGS & Spencer Co., Hartford, Conn.
(See page 191 and 192.)

CINCINNATI Screw & Tap Co., Twightwee, O.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

KEYSTONE Drop Forge Works, Chester, Pa.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

ROCHESTER Machine Screw Co., Rochester, N. Y.

ST. Louis Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., Elyria, O.
(See page 365.)

WOOD SCREWS

AMERICAN Screw Co., Providence, R. I.
(See page 681.)

ATLANTIC Screw Co., Charter Oak Ave., Hartford, Conn.

COLUMBIA Screw Co., 106th St. & Corliss Ave., Chicago, Ill.

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

INTERNATIONAL Machine Screw Co., Springfield, Mass.

KIRK-LATTY Mfg. Co., W. Madison Ave & N. Y. C. Ry., Cleveland, O.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

SCREW MACHINE PRODUCTS

SPECIAL SCREW MACHINE PRODUCTS TO ORDER

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

ANSONIA Mfg. Co., Ansonia, Conn.

ANTHONY Screw Co., 330 Chandler St., Worcester, Mass.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 269.)

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

ATLAS Foundry Co., 991 S. Front St., Columbus, O.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich.
(See page 351.)

BARNES Co., Wallace, Bristol, Conn.

BAY State Screw Co., Hatfield, Mass.

BELVIDERE Screw & Machine Co., Belvidere, Ill.

BIRCHWOOD, C. W., 3614 W. Harrison St., Chicago, Ill.

BLAIR Tool & Machine Works, 24-27 West St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.
(See page 367.)

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

CANFIELD Brake Co., Corning, N. Y.

CASSADY-FAIRBANK Mfg. Co., 6106-20 La Salle St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.
(See page 351.)

CHICAGO Screw Co., 519 Homan Ave., Chicago, Ill.

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 543.)

CINCINNATI Screw & Tap Co., Twightwee, O.

CLARK Novelty Co., Rochester, N. Y.

COLUMBUS Auto Parts & Machine Co., Fourth & E. Goodall Sts., Columbus, O.

CORBIN Screw Corp., New Britain, Conn.
(See page 243.)

CRITCHLEY Machine Screw Co., 100 Beacon St., Worcester, Mass.

DEFIANCE Screw Machine Products Co., Defiance, O.

DETROIT Screw Works, Detroit, Mich.
(See page 739.)

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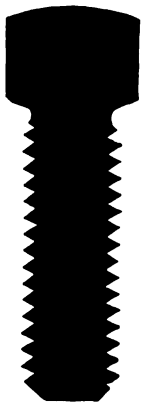
"SCREW MACHINE PRODUCTS"



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"STOCK." A full and complete stock of popular sizes of Standard Screws as follows:

Full Head, Low Head, and Headless Set Screws.
Square, Hexagon, Flat, and Filister Head Cap Screws.
Studs, Taper Pins, Coupling Bolts.

A. L. A. M. Plain and Castle Nuts.
Semi-Finished, Finished and C. H. Hex Nuts.
All threads V, USS and A. L. A. M.

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"SPECIALS." We make to order any piece from Iron, Steel, Brass or Bronze. We will gladly quote.

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The superior finish and exactness common to Acme parts is best evidenced by the fact that they are being generally used by makers of Automobiles and other high grade machines.

Your samples and specifications will bring immediate and reasonable quotations on anything that can be made from bars of brass, iron and steel.

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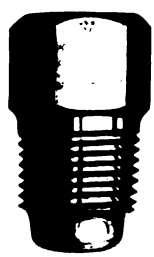

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SCREW MACHINE PRODUCTS (Continued)

SPECIAL SCREW MACHINE PRODUCTS TO ORDER (Continued)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

ECLIPSE Machine Co., Elmira, N. Y.

ELYRIA Machine Parts Co., Elyria, O.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FOSTER Gear Co., 244-46 Kaiser St., Columbus, O.

FRIES & Co., Buffalo, N. Y.
(See page 725.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

GEOMETRIC Tool Co., New Haven, Conn.

HAMPDEN Machine Screw Co., Springfield, Mass.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANSON Bros., Plainville, Conn.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOLT Mfg. Co., W. H., 7 Eddy St., Providence, R. I.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill.
(See page 153.)

INGLE Machine Co., Rochester, N. Y.
(See page 553.)

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich.
(See page 327.)

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LINK-BELT Co., Indianapolis, Ind.
(See page 611.)

M. A. N. Mfg. Co., Providence, R. I.

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

MICHIGAN Screw Co., Lansing, Mich.

MILHOLLAND Machine Co., W. K., Tenth & Canal Sts., Indianapolis, Ind.

MONROE Electric Mfg. Co., Box 57, Monroe, Mich.
(See page 631.)

MOORE, George W., 15 Chardon St., Boston, Mass.

MOSSBERG Co., Frank, Attleboro, Mass.

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 365.)

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Sewing Machine Co., Belvidere, O.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NEW Haven Machine Screw Co., 195 Satonstall Ave., New Haven, Conn.

NIAGARA Brass Works, Buffalo, N. Y.

OHIO Metal Products Co., 39 N. Edgar St., Dayton, O.

PARAGON Brass Works, 87 Center St., New York, N. Y.

PARKER Co., John L., 62 Jackson St., Worcester, Mass.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

PERRY-FAY Mfg. Co., Elyria, Ohio.

PHILADELPHIA Machine Screw Works, 624 Race St., Philadelphia, Pa.

PHILLIPS Co., 35-37 Skilton Ave., Somerville, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 651.)

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

SCREW Machine Products Corp., Thurbers Ave. & Eddy St., Providence, R. I.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 671.)

SMITH Mfg. Co., F. H., Carroll Ave. & St. John's Ct., Chicago, Ill.

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 574.)

STANDARD Machine Screw Co., 2268 Spring Grove Ave., Cincinnati, O.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

STERLING Co., Lafayette, Ind.

TURNER Brass Works, Sycamore, Ill.

U. S. Automatic Co., Amherst, O.

UNIVERSAL Machine Screw Co., 806 Windsor St., Hartford, Conn.

VULCAN Mfg. Co., 1920 W. Kinzie St., Chicago, Ill.

WARREN Screw Co., 676-86 W. Boulevard, Detroit, Mich.

WATERBURY Mfg. Co., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., Elyria, O.
(See page 365.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WILLARD-HARLOW Mfg. Co., Janesville, Wis.

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

YBARRA Mfg. Co., 1814 Whittier St., St. Louis, Mo.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

SCUPPERS

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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GENERAL MACHINE WORK

GASOLINE MOTORS AND POWER PLANTS

THE BLAKE & JOHNSON CO.

MACHINERY DIVISION

WATERBURY, CONN.

ESTABLISHED 1852

PROVIDENCE ENGINEERING WORKS

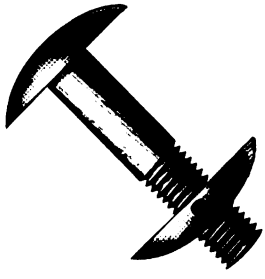
DIFFERENTIAL and TRANSMISSION GEARS

GASOLINE MOTORS for AUTOMOBILES

GENERAL MACHINERY

PROVIDENCE, R. I.

Special Bolts
Machine Bolts
Carriage Bolts
Body Bolts
Wheel Bolts
Nuts, Rivets,
Washers, Screws,
Made of Special
Steels.



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SEARCHLIGHTS

ACETYLENE SEARCHLIGHTS

(See Lamps, Acetylene)

ELECTRIC SEARCHLIGHTS

(See Headlights, Electric)

MOTOR BOAT ACETYLENE SEARCHLIGHTS

AMERICAN Acetylene Stove Co., Masonic Temple, Minneapolis, Minn. "Clear View."

BADGER Brass Mfg. Co., Kenosha, Wis. "Solar."

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

CLEAR VIEW—See American Acetylene Stove Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich (See page 257.)

GRAY & Davis, Amesbury, Mass. (See page 255.)

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y. (See page 257.)

NEVEROUT—See Rose Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N J. (See page 749.)

SAXON Lamp Co., 526-32 W. 28th St., New York N. Y.

SOLAR—See Badger Brass Mfg. Co.

MOTOR BOAT ELECTRIC SEARCHLIGHTS

BOGUE Electric Co., Chas. J., 515 W. 29th St., New York, N. Y.

C-S—See Culver-Stearns Mfg. Co.

CARLISLE & Finch Co., 229-31 E. Clifton Ave., Cincinnati, O.

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass. "C-S."

GENERAL Electric Co., Schenectady, N. Y.

GUIDE Motor Lamp Mfg. Co., Cleveland, O. (See page 61.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. (See page 259.)

O'BRIEN Electrophone Co., Hallowell, Me.

RICHARDSON Engineering & Mfg. Co., Hartford, Conn.

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 749.)

SPRAGUE-WALDO Mfg. Co., 19-23 Harper Ave., Detroit, Mich. (See page 255.)

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

SEATS

DOS-A-DOS SEATS

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y. (See page 751.)

MOTOR CYCLE TANDEM SEATS AND ATTACHMENTS

BRACHER, Wm. F., 82 S. Second St., San Jose, Cal.

LANG, C. H., 35 E. Adams St., Chicago, Ill.

MUELLER, L. J., 6417-21 Woodland Ave., Cleveland, O.

PERFECTION Mfg. Co., 82 N. Fair Oaks Ave., Pasadena, Cal.

SUPPLEMENTARY SEATS

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ANDERSON & Co., F. W., 729 N. Uber St. Philadelphia, Pa. "20th Century."

BUFFINGTON & Co., C. A., Berkshire, N. Y.

DAYTON Folding Tonneau Co., 620-24 Geyer St., Dayton, O.

ELSNER Auto Seat Co., 1139 Washington Ave., Racine, Wis.

EMPIRE Gear & Top Co., 207 N. 22nd St., Philadelphia, Pa.

EUREKA Seat Co., 407-11 Rhode Island St., Buffalo, N. Y.

FREEMAN Mfg. Co., Geo. B., 1415 Racine St., Racine, Wis.

GRAVES & Congdon Co., Amesbury, Mass. "Luxury." (See page 751.)

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill.

LUXURY—See Graves & Congdon Co.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

MARSHALLTOWN Buggy Co., Church St. & Third Ave., Marshalltown, Ia.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

20TH CENTURY—See Anderson & Co.

SEPARATORS

BOW SEPARATORS

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich. (See page 351.)

AUTO Equipment Co., 144 N. Broad St., Philadelphia, Pa. "Paxon."

Complete Index to Classification appears on Pages 8 to 22.

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A MAGNETO

Of Remarkable Simplicity

A SHOCK ABSORBER

With No Surfaces to Wear or Squeak

CONNECTICUT

Your Guarantee of Absolute Reliability

SHOCK ABSORBER

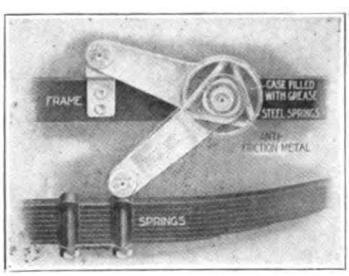
CONNECTICUT Shock Absorbers are designed on a scientifically correct principle.

They exert no braking effect until there is an excessive movement of the car body.

The greater the movement the greater the braking effect, thus effectively eliminating the shock, making "Every Car a Parlor Car." A glance at illustration makes this fact plain.

CONNECTICUT Absorbers make touring a comfort. They save wear and tear upon your tires. They prevent breakage of springs, and protect the entire mechanism of your car. They are sold installed on the car.

Write for particulars and trial offer.



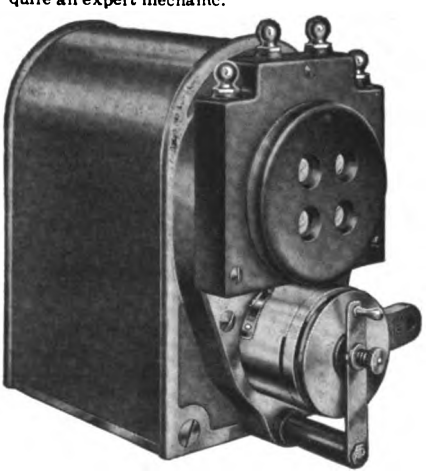
SECTIONAL VIEW

MAGNETO

A novice handles the CONNECTICUT as easily as a skilled electrician. One of the up-to-date features is the interrupter or circuit breaker, which may be instantly withdrawn from its housing without use of tools, for adjusting and cleaning platinum points.

An adjustment gauge furnished with each magneto, so that correct opening of the platinum points can be accurately determined. A filing slot in the interrupter cup is provided as a guide for the purpose of squaring up platinum points if desired.

There is nothing to get out of order—no multitude of complicated and intricate parts which require an expert mechanic.



Write us to-day—now—for Catalog 57—which describes Magneto; and Catalog 27 which is brimful of information about the Shock Absorber.

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1783 Broadway, New York; 1146 Michigan Ave., Chicago, Ill.; 1414-16 Race St., Philadelphia, Pa.; 12 South Eighth St., Minneapolis, Minn.; 544 Van Ness Ave., San Francisco, Cal.

Manufacturers of the famous Connecticut Spark Coils, Timers, Distributors, Switches, Terminals, Meters, Auto-Locks and Exploring Lamps.

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SEPARATORS (Continued)

BOW SEPARATORS (Continued)

AUTO Specialties Mfg. Co., S14A Unity Bldg., Chicago, Ill. "Bair."
(See page 751.)

BAIR—See Auto Specialties Mfg. Co.

BARNDT & Johnston Auto Supply Co., 2032 S. High St., Columbus, O.
(See page 87.)

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill.
(See page 567.)

COWLES & Co., C., New Haven, Conn.
(See page 351.)

COX, David H., Roselle, N. J.

CRANDAL, Stone & Co., Binghamton, N. Y.

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

EBERHARD Mfg. Co., Tennyson St. and C. & P. R. R., Cleveland, O.

FABER Co., A., Rochester, N. Y. "V Z"

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

IROQUOIS Auto Top Co., Utica, N. Y. "Stick Tite."

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MURPHY Co., G. W. J., Merrimac, Mass.

NEVER-RUB—See Springfield Auto Top & Upholstering Co.

NON-CORROSIVE Metal Co., Watertown, Mass.

NOVELTY Mfg. Co., Waterbury, Conn.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y.
(See page 439.)

PAXON—See Auto Equipment Co.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 189.)

SPRINGFIELD Auto Top & Upholstering Co., 102-06 Dwight St., Springfield, Mass. "Never-Rub."

STICK TITE—See Laman Auto Top Co.

V Z—See Faber Co.

VICTOR Rubber Co., Springfield, O.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

GASOLINE SEPARATORS

(See Strainers, Gasoline)

SHAFTING

FLEXIBLE SHAFTING

AUTOMOBILE Supply Mfg. Co., 220-22 Taaffe Pl., Brooklyn, N. Y.
(See page 241.)

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

STOW Flexible Shaft Co., 26th & Callowhill Sts., Philadelphia, Pa.

WEBB Mfg. Co., 156-58 Front St., Newark, N. J.
(See page 85.)

WHITE Dental Mfg. Co., S. S., 12th & Chestnut Sts., Philadelphia, Pa.

SHAFTS

CAMSHAFTS

(See Camshafts, Finished)

COUNTERSHAFTS

(See Countershafts, Finished)

CRANKSHAFTS

(See Crankshafts; also Forgings, Drop)

FLEXIBLE SHAFTS

(See Shafting, Flexible)

PROPELLER SHAFTS

HARTFORD Auto Parts Co., 83 Hayshope St., Hartford, Conn.
(See page 251.)

KINSLER-BENNETT Co., Hartford, Conn.
(See page 741.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

SPICER Mfg. Co., Plainfield, N. J.
(See page 251.)

SHELLS

COPPER BOILER SHELLS

RANDOLPH - CLOWES Co., Waterbury, Conn.

STEEL BOILER SHELLS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 657.)

PRESSED Steel Tank Co., West Allis, Wis.

SHIELDS

GLASS WIND SHIELDS

ACKERMAN—See Smith & Co.

Complete Index to Classification appears on Pages 8 to 22.

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THE

DETROIT STEERING WHEEL

AND

WIND SHIELD COMPANY

are Manufacturers of

"Detroit Steering Wheels"
"Wayne Automatic Wind Shields"

Inquiries Invited

Main Office at Wind Shield Plant:

74-78 FORT STREET EAST

DETROIT, MICH.

Steering Wheel Factory: 274-288 Wight St.

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SHIELDS (Continued)

GLASS WIND SHIELDS (Continued)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

AMERICAN Auto Top Mfg. Co., 244-50 W. 49th St., New York, N. Y. (See page 659.)

ANDERSON & Co., F. W., 729 N. Uber St., Philadelphia, Pa.

ARROW Wind Shield Co., 6122 Euclid Ave., Cleveland, O.

AUTO Necessities Co., 400 E. 61st St., New York, N. Y.

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

AUTO Wind Deflector Co., 46-48 Lexington Ave., Brooklyn, N Y.

AUTO Wind Shield Co., University Rd., Cambridge, Mass.

AUTOMATIC—See Mezger, C. A.

AUTOMOBILE Specialty Co., 620 Maryland Ave., Pittsburg, Pa. "McGiffin."

B. & B. Mfg. Co., 6207 Cedar Ave., Cleveland, O.

BADGER—See Wisconsin Auto Top Co.

BANKER Wind Shield Co., Ellsworth Ave. & Summerlea St., Pittsburg, Pa.

BEAN Windshield Co., 466 Main St., Malden, Mass.

BEECHER—See Limousine-Carriage Mfg. Co.

BLASIER Mfg. Co., M. E., 331 Columbia St., Utica, N. Y.

BREEZE—See Cartier Mfg. Co.

BRIDGEPORT Vehicle Co., Holland & Fairfield Aves., Bridgeport, Conn.

BUOB & Scheu, 401 Court St., Cincinnati, O.

BURROWES Co., E. T., Portland, Me.

CARTIER Mfg. Co., Ludington, Mich "Breeze."

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill.

CHICAGO Wind Shield Co., 1527-43 S. Halsted St., Chicago, Ill.

COLLINS-GREEN Mfg. Co., 429 Brooklyn Ave., Detroit, Mich. (See page 375.)

COLLINS & Son, G. A., Main & Church Sts., Akron, O.

COLUMBIA Tire & Top Co., 31 Irvington St., Boston, Mass.

COLUMBUS Auto Parts & Machine Co., Fourth & E. Goodall St., Columbus, O "Duplex."

COX Brass Mfg Co., Albany, N. Y.

CRAMER, Harry C., 217 S. 24th st., Philadelphia, Pa.

DETROIT Steering Wheel & Wind Shield Co., 74-78 Fort St., E., Detroit, Mich. "Wayne." (See page 371.)

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

DUANE & Co., W. J., 230 W. 58th St., New York, N. Y.

DUPLEX—See Columbus Auto Parts & Machine Co.

DUQUESNE Auto-Parts Co., 5715-17 Kirkwood St., E. E., Pittsburg, Pa.

EAGLE Co., 98 Warren St., Newark, N. J. "Hydraulic."

ELLIS-TONNELE Co., 120-32 Pacific St., Newark, N. J.

EMPIRE Auto Top & Supply Co., 1219-21 Michigan Ave., Chicago, Ill.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

EMPIRE Top & Wind Shield Co., 221 Pleasant St., Boston, Mass.

ENGLISH & Mersick Co., New Haven, Conn.

FELLWOCK Automobile & Mfg. Co., 3 Upper Fourth St., Evansville, Ind.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FLANDERS Mfg. Co., Titusville, Pa.

FRAZIER & Co., W. S., Aurora, Ill.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Milwaukee." (See page 283.)

GATES-OSBORNE Mfg. Co., 10 S. Second Ave., Marshalltown, Ia.

GORDON—See Vehicle Apron & Hood Co.

HAWTHORNE Mfg. Co., 29 Spruce St., Bridgeport, Conn. (See page 673.)

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HOLCOMB Co., New Haven, Conn. "New Haven."

HYDRAULIC—See Eagle Co.

IDEAL Wind Shield Co., 1926 Broadway, New York, N. Y.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JACOBSON Bros., Bergen St. & 14th Ave., Newark, N. J.

JOHNSON Service Co., Milwaukee, Wis.

KIMBALL & Co., C. P., 315 Michigan Ave., Chicago, Ill.

KNIGHT-JONES Equipment Co., 2431 Michigan Ave., Chicago, Ill.

KOHL Mfg. Co., Tenth and Canal Sts., Indianapolis, Ind.

KRAHN Mfg. Co., Milwaukee, Wis.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill. "Beecher," "Schildback," "Voltz."

LOCKWOOD Co., 34 Mechanic St., Newark, N. J.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

McGIFFIN—See Automobile Specialty Co.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MEDINA Machine & Stamping Co., Medina, N. Y. "Whirlwind."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

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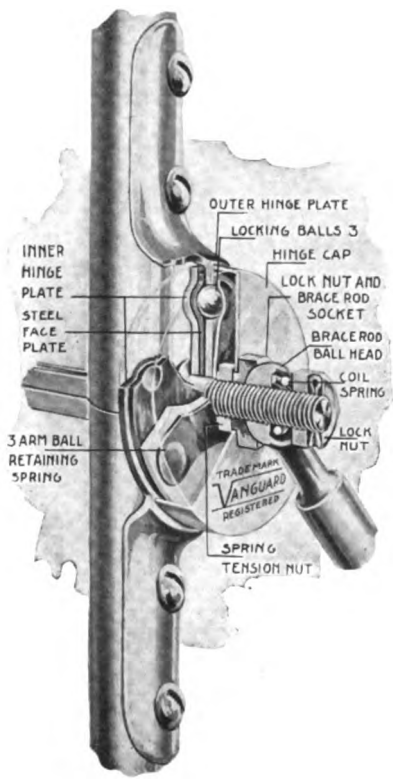
Vanguard 1911

Ball Bearing Wind Shields

SIMPLE SILENT

SOLID as the

ROCK OF GIBRALTAR



Furnished in Straight Folding or Zig Zag Styles.

Made in the Largest Exclusive Wind Shield Factory in the World

Write for Descriptive Literature and Prices They can not fail to interest you.

Vanguard Manufacturing Co.

JOLIET, ILL.

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SHIELDS (Continued)

GLASS WIND SHIELDS (Continued)

MEZGER, C. A., 239 W. 56th St., New York, N. Y. "Automatic."

MILBRADT Mfg. Co., 1436 N. Eighth St., St. Louis, Mo.

MILWAUKEE—See Garage Equipment Mfg. Co.

MODEL Iron & Wire Works, 3200 Vliet St., Milwaukee, Wis.

MONARCH Auto Top & Supply Co., 1461 Michigan Ave., Chicago, Ill.

MURRAY & Co., P. A., Newton, Mass.

MUTUAL Wind Shield Mfg. Co., College & Ellsworth Aves., Pittsburg, Pa.

NATIONAL Auto Top Co., 244-50 W. 49th St. New York, N. Y.

NEW HAVEN—See Holcomb Co.

NEWARK Rivet Works, 262 Lafayette St., Newark, N. J.

NOVELTY Mfg. Co., Waterbury, Conn.

PARSONS-CURTIS Top Co., 1312-16 W. Harrison St., Chicago, Ill.

PEERLESS Windshield Co., Buffalo, N. Y.
(See page 619.)

PERKINS, A. D., Pico & Flower Sts., Los Angeles, Cal.

PHELPS, F. Z., 1243-45 Niagara St., Buffalo, N. Y.

PIERCE & Co., Geo. W., Anderson, Ind.

PITTSBURG Auto Equipment Co., Beatty St. E. E., Pittsburg, Pa. "Union."

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RACINE Buggy Top Co., Racine, Wis.

RANDS Mfg. Co., 67-89 Fort St., E., Detroit, Mich.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDBACK—See Limousine-Carriage Mfg. Co.

SIMON Auto Top & Supply Co., S., 300 E. 17th St., Kansas City, Mo.

SMITH & Co., Jos. N., Detroit, Mich. "Ackerman."
(See page 189.)

SPRAGUE Umbrella Co., Norwalk, O.
(See page 433.)

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING Auto Top Co., 144 W. Congress St., Detroit, Mich.

STUDEBAKER Bros. Mfg. Co., 378 Wabash Ave., Chicago, Ill.

SUPERIOR Mfg. Co., Ann Arbor, Mich.

TEEL Mfg. Co., 132 Main St., Medford, Mass.

TROY Carriage Sun Shade Co., Troy, O.

20th Century Motor Car Supply Co., So. Bend, Ind. "Williams."
(See page 729.)

UNION—See Pittsburg Auto Equipment Co.

UNION Auto Specialty Co., 346-52 Collins Ave,. Pittsburg, Pa.

UNIVERSAL Wind Shield Co., 1614 Prairie Ave., Chicago, Ill.
(See page 375.)

VANGUARD Mfg. Co., Joliet, Ill.
(See page 373.)

VASCO—See Victor Auto Supply Mfg. Co.

VEHICLE Apron & Hood Co., Columbus, O. "Gordon."

VICTOR Auto Supply Mfg. Co., 45 W. 43d St., New York, N. Y. "Vasco."
(See pages 376 and 377.)

VOLTZ—See Limousine-Carriage Mfg. Co.

WALL Mfg. Co., R. C., 1334-36 Race St., Philadelphia, Pa.

WAYNE—See Detroit Steering Wheel & Wind Shield Co.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto Top & Supply Co., 1122-26 E. 15th St., Kansas City, Mo.
(See page 437.)

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WESTERN Wind Shield Works, 1513 Hennepin Ave., Minneapolis, Minn.

WHIRLWIND—See Medina Machine & Stamping Co.

WILLIAMS—See Twentieth Century Motor Car Supply Co.

WISCONSIN Auto Top Co., Racine, Wis. "Badger."
(See page 659.)

WOOD & Son, Frederick R., 217 W. 19th St., New York, N. Y.

SHIMS

BRASS AND COPPER SHIMS AND LINERS

CHANDLER Co., 31 Taylor St., Springfield, Mass.

FITZGERALD Gasket Co., Torrington, Conn.
(See page 553.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

GOODWIN & Kintz Co., Winsted, Conn.

McCORD Mfg. Co., Detroit, Mich.
(See pages 58 and 59.)

VICTOR Mfg. & Gasket Co., 3000 W. 21st Pl., Chicago, Ill.
(See page 361.)

SHOCK ABSORBERS

AEROPLANE SHOCK ABSORBERS

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

KILGORE Mfg. Co., 585 Boylston St., Boston, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa
(See page 663.)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS

ACME Torsion Spring Co., 131 State St., Boston, Mass.

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THE SHIELD THAT *STAYS* SOLD

THE UNIVERSAL

"Aristocrat of Wind Shields."

It *satisfies* every customer and *doesn't* come back for repairs.

***EASIEST* TO SELL IN THE FIRST PLACE**

The simple, beautiful lines—the highly polished brass and crystal clear French Plate Glass impress at first sight.

Up in a *jiffy*—down *quicker*—

Leaves the line of vision clear—not split by misplaced dividing bars—

Folds *flat* over the hood when not in use.

Your customer appreciates these *distinctive* features. FOR LIFE! That's the length of the *anti-rattle, perfect* construction guarantee we issue with *every* Universal Shield. Universals are the most *profitable* accessory you can handle.

OUR BUYER BRINGING PLAN WILL BOOST *YOUR* BUSINESS.

Write right now for details.

UNIVERSAL WIND SHIELD COMPANY

1614 Prairie Avenue **CHICAGO**

Ball Operating Wind Shield

Operated with one hand.

Locks in FOUR positions.

No rattle or noise.

No side pumps to leak or to get out of order.

No coil springs to wear out.

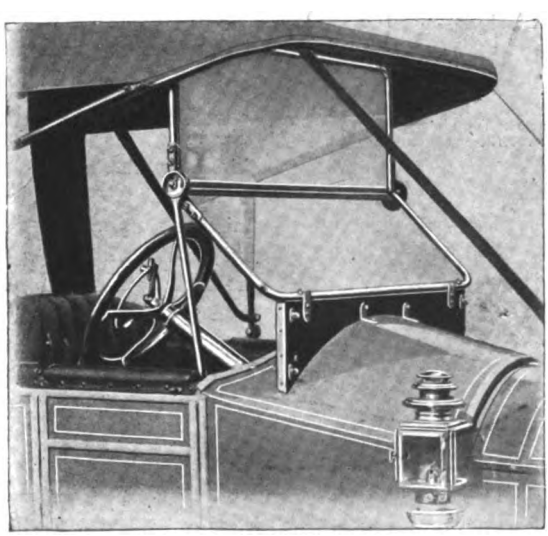
No rubber packing.

Solid brass. No castings.

Locking device steel balls against a steel plate.

Best of PLATE GLASS packed in spring brass.

Best constructed and neatest looking shield on the market.



Collins-Green Mfg. Co., **429 Brooklyn Avenue Detroit, Mich.**

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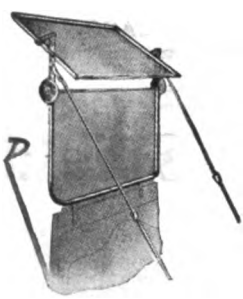
The VASCO

NEW PR

Model 1 -- 30 x 41	Full Channel Brass
Model 3 -- 30 x 41	Semi-Clear Vision
Model 5 -- 30 x 41	Full Clear Vision
Model 2 -- 30 x 43	Full Channel Brass
Model 4 -- 30 x 43	Semi-Clear Vision
Model 6 -- 30 x 43	Full Clear Vision
Model 1912 -- 41 in.	Fold in Middle
Model 23	Zig-Zag Shield
Vasco Bumper	- - - - - - - -



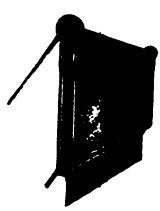
Position for rain, snow and sleet. You see the road between the sashes.

Folded Position
It breaks in the middle and has a forward motion, which allows it to pass the wheel.

EXAMINE OUR SHIELDS and you will note that we are one year ahead of any other shield in construction and in perfection of detail.

EXAMINE OUR PRICES and you will see what has been accomplished in economy of manufacture, through our enormously increased facilities.

Our sweeping reduction of over 40% in list price of VASCO Wind Shields has established a new standard. A strictly high-grade product is now offered at a price asked for ordinary shields, which are in no way comparable to the VASCO either in workmanship, finish or appearance and cannot possibly contain the many exclusive and individual features to be found in the VASCO.



No. 1912

Automatic one-hand control—Six different positions—Simplicity of design—elegance of finish—Always dependable—Positive locking automatic friction

VICTOR AUTO SUPPLY MFG. CO., Inc

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WIND SHIELDS

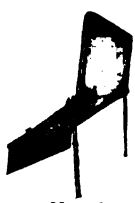
CE LIST

Formerly $40.00	NEW PRICE, $25.00
Formerly $42.50	NEW PRICE, $25.00
Formerly $45.00	NEW PRICE, $25.00
Formerly $42.50	NEW PRICE, $27.50
Formerly $45.00	NEW PRICE, $27.50
Formerly $47.50	NEW PRICE, $27.50
Formerly $25.00	NEW PRICE, $15.00
Formerly $30.00	NEW PRICE, $17.50
Formerly $15.00	NEW PRICE, $12.00

disc — Can be locked at any angle — Folds over hood when desired — Clear line of vision — No spring catches or intricate mechanism — Cannot break, rattle or work loose.

DEALERS AND AGENTS

Better write for our agency proposition to-day. VASCO Wind Shields are wonderfully quick sellers, and our local representatives all over the country are reaping the benefits of our extensive advertising campaign, which, added to the great reduction in list price, will give you a monopoly on the Wind Shield business in your section. We have a splendid proposition for dealers, and your territory may still be unallotted. Write to-day.



No. 23
The Vasco Zig Zag

OTHER VASCO PRODUCTS

The Vasco Bumper

The VASCO Bumper without a doubt is the finest automobile bumper of the day. It is made to fit any car, and can be attached without drilling holes in the frame. It is made of a heavy steel tube, over which a brass shell is drawn. The springs are made of square steel, which is accepted as being the strongest spring made, and will stand the heaviest blow or shock without breakage. The springs are concealed in telescoping tubes, which prevent dirt and water coming in contact with the springs, thereby eliminating all rust; and while it is the strongest bumper made, it is also the lowest priced.

Don't use any more emery and oil for grinding valves, many a good cylinder has been scored by its use, which is the cause of 50% lost power. Grindine compound eliminates all this danger. It can be used without the danger of it getting in the cylinder. It is put up in tubes and retains the proper consistency. No dirt or grit can come in contact with the compound. It cuts more rapidly and smoothly than the old-fashioned emery and oil mixtures.

Put up in cartons, containing two tubes, one coarse and one fine.

It is made in two sizes, 25c. and 75c.

Vasco Grindine

15 West 43rd St., NEW YORK CITY

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SHOCK ABSORBERS (Continued)

SHOCK ABSORBERS AND SUPPLEMENTARY SPRINGS (Continued)

AMERICAN Whistle Co., 16 Wakefield Ave., Buffalo, N. Y.
(See page 477.)

AUTO-CUSHION—See Mellen-Edwards Co.

B-K Mfg. Co., 96-102 High St., Boston, Mass.
(See page 673.)

BALL Bearing Shock Absorber Co., 25 Broad St., New York, N. Y.

BI-CAL-KY Auxiliary Spring Co., 866 Prospect Ave., Buffalo, N. Y.

BLACKLEDGE Mfg. Co., John W., 1502 Michigan Ave., Chicago, Ill. "Velvet."

BOSTON—See Knapp-Greenwood Co.

BOW Shock Absorbing Spring Co., 145 La Salle St., Chicago, Ill.

COMSTOCK Shock Absorber Co., Thoroughfare Bldg., New York, N. Y.

FLENTJE, Ernst, 1643 Cambridge St., Cambridge, Mass.
(See page 381.)

FOSTER—See Gabriel Horn Mfg. Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O. "Foster."

GURNEY, C. S., Portsmouth, N. H.

HARTFORD Suspension Co., 149 Bay St., Jersey City, N. J. "Truffault-Hartford."
(See pages 379 and 380.)

HERZ & Co., Puck Bldg., New York, N. Y. "Pater-Noster."
(See page 335.)

HOOVER Auxiliary Spring Co., 1003 S. Main St., Los Angeles, Cal.

INDIANAPOLIS Bolster Spring Co., 326 W. Georgia St., Indianapolis, Ind. "Victor."

KENTZINGER Vehicle Shock Absorber Co., 115 S. Broadway, St. Louis, Mo.

KILGORE Mfg. Co., 585 Boylston St., Boston, Mass.

KNAPP-GREENWOOD Co., 25 Pemberton Sq., Boston, Mass. "Boston."

MARTIN Shock Absorber Co., 926 Central Ave., Los Angeles, Cal.

MASSEY & Fisher, First National Bank Bldg., Chicago, Ill.

MEARS—See Phillips Mfg. Co.

MELLEN - EDWARDS Co., Beloit, Wis "Auto-Cushion."

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y.
(See page 733.)

MITCHELL & Co., 45 Cross St., Portland, Me.

MURDOCK, John C., Brodhead, Wis.

PARFREY Shock Absorber Co., 1629 First Ave., New York, N. Y.

PATER-NOSTER—See Herz & Co.

PEERLESS—See Sager Co.

PENFIELD Shock Absorber Co., 49 Randolph Ave., Meriden, Conn.

PHILLIPS Mfg. Co., 60 Wall St., New York, N. Y. "Mears."

REDMOND Mfg. Co., C. A., 17-19 Central Ave., Los Angeles, Cal.

RELIANCE Shock Absorber Co., 101 Tremont St., Boston, Mass.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Peerless."

ST. LOUIS Supplementary Spiral Spring Co., 4523 Delmar Ave., St. Louis, Mo.

SCOTT Governor Spring Co., 3135-41 Lincoln Ave., Chicago, Ill.

SHIPPEY Co., Geo. E., Pittsfield, Mass.

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

SPRING Equalizer Co., Detroit, Mich.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

THEOBOLD Mfg. Co., Geo., Society for Savings Bldg., Cleveland, O.

TRIPLE Action Spring Co., 215-17 E. 21st St., Chicago, Ill.

TRUFFAULT - HARTFORD — See Hartford Suspension Co.

VELVET—See Blackledge Mfg. Co.

VICTOR—See Indianapolis Bolster Spring Co.

WEEBER Mfg. Works, C. F., Albany, N. Y.

WESTEN Mfg. Co., 290 Halsey St., Newark, N. J.
(See page 381.)

SHOES

INNER TIRE SHOES

(Shoes or Sleeves to be used between outer shoe and inner tube as a protector and reinforcement. For Outer Shoes or Manchons—See Sleeves, Tire Repair)

AKRON—See Empire Mfg. Co.

AMERICAN Rubber Works, Commerce St. & Third Ave., N., Nashville, Tenn. "Peerless."

BULL Dog—See Pennsylvania Rubber Co.

COX, David H., Roselle, N. J.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers.) "Kempshall."

DAYTON Inner Tire & Mfg. Co., Dayton, O.

DIAMOND Rubber Co., Akron, O.
(See page 139.)

DOUBLE Fabric Tire Co., Auburn, Ind. "Murray."

EMPIRE Mfg. Co., Akron, O. "Akron."

GORDON—See Vehicle Apron & Hood Co.

GOODFELLOW Tire Co., 3179 E. Grand Blvd., Detroit, Mich.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.
(See page 643.)

IDEAL—See Voorhees Rubber Mfg. Co.

INDIA Rubber Tire Co., 1461-63 Michigan Ave., Chicago, Ill.

INNER Shoe Tire Co., 64 Pearl St., Grand Rapids, Mich. "Innershu," "Shur-hold," "Klincher."

INNERSHU—See Inner Shoe Tire Co.

KEMPSHALL—See Cryder & Co.

K. & W. Mfg. Co., Ashland, O.
(See page 385.)

Complete Index to Classification appears on Pages 8 to 22.

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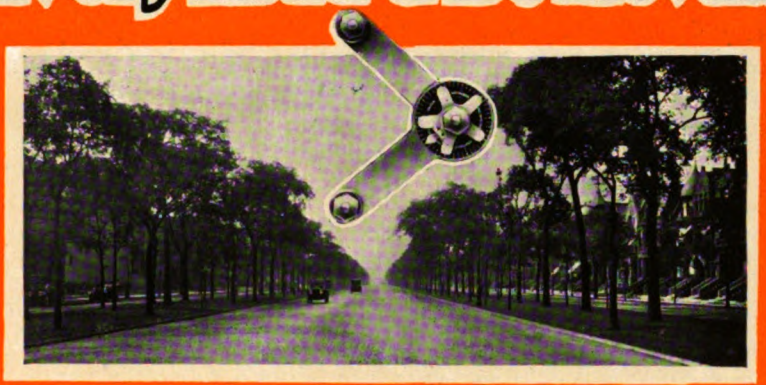
Every Road a Boulevard



WHEN THE CAR IS EQUIPPED WITH

Truffault-Hartford
SHOCK ABSORBER

"MAKES ALL ROADS SMOOTH ROADS"

Saves the tires from rapid wear by preventing bouncing and skidding.

Insures perfect traction which is essential to perfect control by keeping the wheels on the ground.

Conserves the efficiency of the engine by protecting it from road vibrations.

Prevents spring breakage by controlling both up and down movements and keeping the springs within their normal working limits.

Makes a car more salable by making it a better car.

A test affords the best criterion of the Truffault-Hartford's worth.

We can fit any car and make any car fit for any road.

Write for interesting particulars; it will pay you.

HARTFORD SUSPENSION COMPANY
149 BAY STREET JERSEY CITY, N. J.
EDW. V. HARTFORD, President

Branches:
New York: 212-214 West 88th Street
Philadelphia: 250 N. Broad Street
Boston. 319 Columbus Avenue
Chicago: 1458 Michigan Avenue
Newark: 289 Halsey Street

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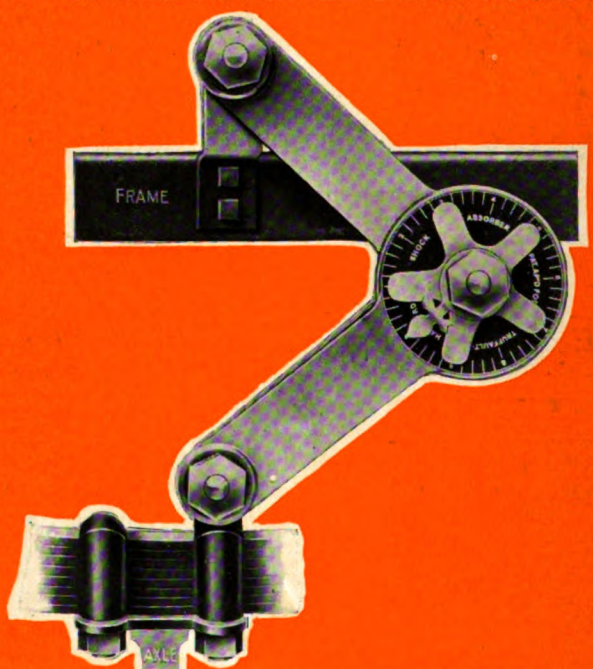
Truffault-Hartford
SHOCK ABSORBER

"MAKES ALL ROADS SMOOTH ROADS"



A business maker and a business holder for Dealer and Manufacturer alike.
The standard shock absorber of motordom. Used in all important motoring events. Regular equipment on such cars as the:—

PACKARD
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APPERSON
COLUMBIA
CHADWICK
GARFORD
OLDSMOBILE
PIERCE-ARROW
STEVENS-DURYEA
RAMBLER
AMERICAN
RAINIER
AMPLEX
HALLADAY

Sold on a "GUARANTEED-TO-GIVE-SATISFACTION" the TRUFFAULT-HARTFORD always makes good. Our generous agency terms will make it worth your while to handle this auto equipment necessity. Write now for details.

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149 BAY STREET JERSEY CITY, N. J.
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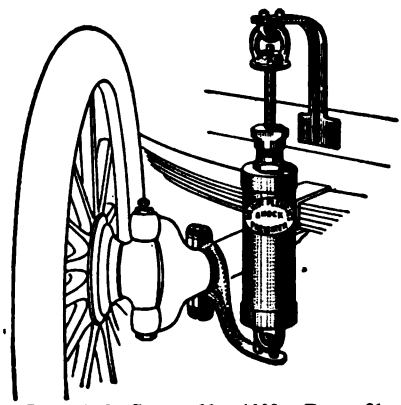
30 DAYS' FREE TRIAL

—OF THE—

Flentje Hydraulic Shock Preventer



Patented Sept. 29, 1908, Dec. 21, 1909, U. S. A., France, Germany, England, Canada. Other patents pending.

will convince you beyond a doubt that the Flentje Shock Preventer is the "BEST IN THE WORLD."

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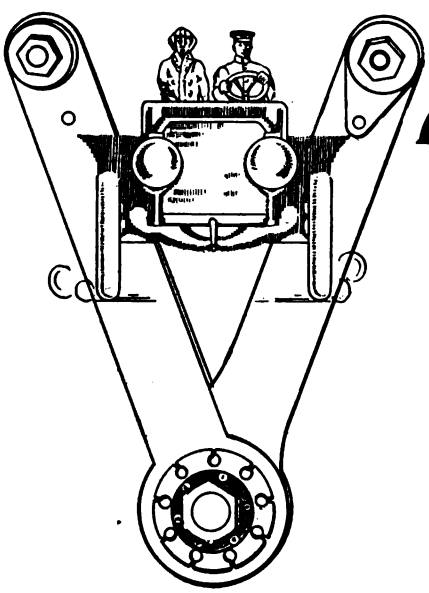

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SHOES (Continued)

INNER TIRE SHOES (Continued.)

KLINCHER—See Inner Shoe Tire Co.

M. & M. Mfg. Co., Akron, O.

MARKS—See Middlesex Co.

MIDDLESEX Co., N. Y. Life Bldg., New York, N. Y. "Marks."

MURRAY—See Double Fabric Tire Co.

O'NEILL Tire & Protector Co., Buchtel Ave., Akron, O.

PEERLESS—See American Rubber Works.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa. "Bull Dog." (See page 663.)

SHUR-HOLD—See Inner Shoe Tire Co.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

TRAVER Blowout Patch Co., Thoroughfare Bldg., New York, N. Y.

VEHICLE Apron & Hood Co., Columbus, O "Gordon."

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Ideal."

WABAN Webbing Co., 16 South St., Boston, Mass.

WARRIOR Tire Shoe Co., 45 Benefit St., Worcester, Mass.

WEARWELL Rubber Co., 107 S. Washington St., Marion, Ind.

WESTERN Automobile Supply Co., Chicago, Ill. (See page 747.)

YANKEE Co., Utica, N. Y. (See page 297.)

SIGHT-FEEDS

INDEPENDENT SIGHT-FEEDS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

KRAHN Mfg. Co., Milwaukee, Wis.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McCORD Mfg. Co., Detroit, Mich. (See pages 58 and 59.)

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

PEDERSEN Lubricator Co., 636-44 First Ave., New York, N. Y. (See page 267.)

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

SIGNALS

REAR TRAFFIC SIGNALS

COWLES & Co., C., New Haven, Conn. (See page 351.)

DOYLES—See Warning Light Co.

EMSHEIMER, Chas., 583 Broadway, New York, N. Y.

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y. (See page 323.)

NEIL, Geo. E., Cleveland, O.

O'CONNOR Co., E. L., 1269-71 Broadway, New York, N. Y.

WARNING Light Co., 1777 Broadway, New York, N. Y. "Doyles."

ROCKET SIGNALS

COSTON Signal Co., 7 Water St., New York, N. Y.

SILK

SPOOL SILK

MEYER & Co., John C., Lowell, Mass.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

UPHOLSTERY SILK

CHENEY Bros., So. Manchester, Conn.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

SINKS

GALLEY SINKS

DIEM, Gus A., 20 Fulton St., New York, N. Y.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

MARINE Hardware Co., Peabody, Mass.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

SKYLIGHTS

BATH Marine Construction Co., Upper Washington St., Bath, Me.

LAWLEY & Son Corp., Geo., Neponset, Mass.

THOMPSON Boat & Pattern Works, H. F., Decorah, Ia.

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AKRON—See Empire Mfg. Co.

ALDING—See Alsten & Goulding.

ALSTEN & Goulding, 36 Foster St., Worcester, Mass. "Alding."

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CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

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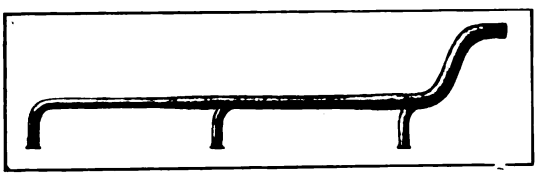

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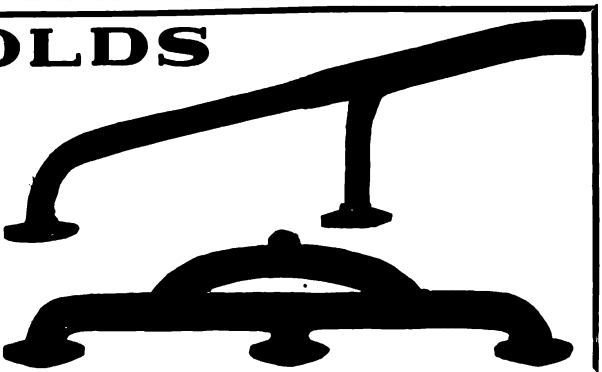

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SLEEVES (Continued)

TIRE REPAIR SLEEVES OR BANDS (Continued.)

COX, David H., Roselle, N. J.

DAVIS CO., W. C., 600 N. Main St., Montello, Mass. "Star."

DOUBLE Fabric Tire Co., Auburn, Ind.

EMPIRE Mfg. Co., Akron, O. "Akron."

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

G & J Tire Co., Indianapolis, Ind.

G. & K.—See Graton & Knight Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GOODRICH Co., B. F., Akron, O.

GORDON—See Vehicle Apron & Hood Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G. & K."
(See page 385.)

KIMBALL Tire Case Co., 171 Broadway, Council Bluffs, Ia.

LEATHER Tire Goods Co., Niagara Falls, N. Y.
(See page 75.)

MESINGER Mfg. Co., H. & F., 1801-03 First Ave., New York, N. Y.
(See page 733.)

MICHELIN Tire Co., Milltown, N. J.

NATIONAL Leather Belting Co., 29 Ferry St., New York, N. Y.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

STAR—See Davis, W. C.

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

VEHICLE Apron & Hood Co., Columbus, O "Gordon."

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

WEARWELL Rubber Co., 107 S. Washington St., Marion, Ind.

SLIDES

COMPANION WAY SLIDES

LAWLEY & Son Corp., Geo., Neponset, Mass.

SOAPS

AUTOMOBILE SOAPS

(See also Polishes, Automobile)

AMALIE—See Sonneborn Sons.

AMBER & Klenzer Co., Tenth & Canal Sts., Indianapolis, Ind.

AMERICAN CROWN—See Kirk & Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco."
(See page 219.)

AMERICAN Oil & Disinfectant Co., 96 Beekman St., New York, N. Y.

AMOCO—See American Oil Co.

ARCOLINE—See Atlantic Refining Co.

ATLANTIC Refining Co., 2 Wise Bldg., Cleveland, O. "Arcoline."
(See page 285.)

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

BAUM'S Castorine Co., Rome, N. Y.

BELL Oil Co., 51 Ferry St., St. Louis, Mo. "Liberty Bell."

BLUE RIBBON—See International Metal Polish Co.

BUCKEYE—See Davies Co.

BULLY—See New York Oil & Paint Co.

CHARIOT—See Fiske Bros. Refining Co.

COLUMBIA Lubricants Co. of New York, 116 Broad St., New York, N. Y.

DAVIES Co., J. P., Dayton, O. "Buckeye."

EAGLE Oil & Supply Co., Boston, Mass. "Eoco."
(See page 217.)

EOCO—See Eagle Oil & Supply Co.

FAIRCHILD & Bro., M. H., 20 W. Michigan St., Chicago, Ill.

FISCHER & Co., H., 942-44 W. Fifth St., Cincinnati, O. "Linosoap."

FISK Mfg. Co., Springfield, Mass.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Chariot."

FORD & DENNAN—See Richmond & Co.

G. W.—See Great Western Oil Co.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "G.W."

HERCULES Chemical Works, 1904 W. Van Buren St., Chicago, Ill. "Non Such."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

HOOSIER Mfg. Co., 372 S. Illinois St., Indianapolis, Ind. "Knoxall."

HYDRO-PALM Soap Co., 22 Minot St., Neponset, Mass.

IDEALO Co., 321 Bourse, Philadelphia, Pa. "Perfecto."

INTERNATIONAL Metal Polish Co., 2142 N. Capitol Ave., Indianapolis, Ind. "Blue Ribbon."

KAUFMAN Oil & Grease Co., L., Pittsburg, Pa. "Premium."

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass. "Olivine."

KIRK & Co., James S., 106 E. Michigan St., Chicago, Ill. "American Crown."

KNOXALL—See Hoosier Mfg. Co.

LIBERTY Bell—See Bell Oil Co.

LINO O—See Strunz & Son.

LINOSOAP—See Fischer & Co.

McLEAN-JONES Oil & Supply Co., 65 Long Wharf, Boston, Mass.

MAGIC—See Zurn Co.

MOBO—See Stanley, John T.

MODOC Co., Fernwood, Pa.

MONAHAN Antiseptic Co., 100 Market St., Chicago, Ill. "Simplex."

MONARCH Mfg. Co., Council Bluffs, Ia.

MURPHY'S—See Phoenix Oil Co.

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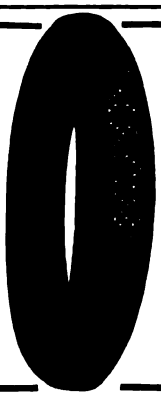

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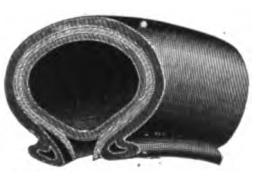

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NATIONAL Refining Co., 1063 Rose Bldg., Cleveland, O.

NATIONAL Tripoli Co., 15 Jay St., New York, N. Y.

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y. "Bully."

NORTHRUP Lubricating Oil Co., 308 N. Commercial St., St. Louis, Mo.

OLIVINE—See Kenney Mfg. Co.

'ERFECTO—See Ideale Co.

PHOENIX Oil Co., 557 W. 22d St., New York, N. Y. "Murphy's."

PREMIUM—See Kaufman Oil & Grease Co.

PURITAN Soap Co., 502 Exchange St., Rochester, N. Y.

QUAKER Soap Co., 207-13 Provost St., Jersey City, N. J.

REXINE Co., 725 New York Ave., Sheboygan, Wis.

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Ford & Dennan."

ROBERTSON Co., J. T., Manchester, Conn.

ROME Soap Mfg. Co., Rome, N. Y.

SIMPLEX—See Monahan Antiseptic Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPEARE'S Sons' Co., Alden, 367 Atlantic Ave., Boston, Mass.

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Mobo."

STRUNZ & Son, S., 708 Bingham St., Pittsburg, Pa. "Lino O."

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

TAYLOR Mfg. Co., 468 Main St. (Charlestown), Boston, Mass.

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O.

WASHZUM—See White & Bagley Co.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Washzum."

WHIZOIL—See Hollingshead Co.

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.

ZURN Co., O. F., Broad St. & Lehigh Lane, Philadelphia, Pa. "Magic."

HAND SOAPS AND PASTES

A 1—See Rath Co.

ALDING—See Alsten & Goulding.

ALSTEN & Goulding, 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Talc Co., 22-24 Custom House St., Boston, Mass. (See page 85.)

BARRABEE & Jones, 46 Columbus Ave., Boston, Mass. "Nu-Find."

BATES, Howard M., 1034 Fairmount Ave., Philadelphia, Pa. "Grit," "Rite Off."

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Peerless."

BOBRICK Chemical Co., 111-17 S. Garey St., Los Angeles, Cal. "Sop-O-Zon."

CLEAN-PAW—See Frost, F. E.

CLEANEASY—See Winn, Wm. R.

CLEANZUM—See White & Bagley Co.

CONSOLIDATED Chemical Co., 208 W. Kinzie St., Chicago, Ill.

CROSS & Co., W. H., 29 Murray St., New York, N. Y. "Uneedit."

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass.

ERICKSON Soap Co., 184-88 Smith St., Hartford, Conn.

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FROST, F. E., 505 Main St., Worcester, Mass. "Kuick Klean." "Clean-Paw."

GIT Mfg. Co., 174 State St., Hartford, Conn. (See page 387.)

GRE-SOLVENT—See Utility Co.

GRIT—See Bates, Howard M.

HANDY—See New York Oil & Paint Co.

HASTINGS & Miller, 118 Nassau St., New York, N. Y.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Krystal Soiloff."

HOPEWELL Bros., 29 Chapel St., Newton, Mass. "Paos." (See page 767.)

HYDRO-PALM Soap Co., 22 Minot St., Neponset, Mass.

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KLEENU Mfg. Co., 516-24 W. 25th St., New York, N. Y.

KLENZOLA Co., 1300 Peach St., Erie, Pa.

KRYSTAL SOILOFF—See Hollingshead Co.

KUICK-KLEAN—See Frost, F. E.

LAVA—See Waltke & Co.

MATTOON Mfg. Co., 120 Allyn St., Hartford, Conn.

MIONE Mfg. Co., 7 Ford Pl., Hartford, Conn.

NESMITH Co., C. I., Reading, Mass. "Rex." (See page 759.)

NEW York Oil & Paint Co., 128 Maiden Lane, New York, N. Y. "Handy."

NU-FIND—See Barrabee & Jones.

OL-SE-CO.—See Saponal Chemical Co.

PAOS—See Hopewell Bros.

PEERLESS—See Blue Ribbon Mfg. Co.

RADIUM Compound Co., Phoenix, N. Y.

RATH Co., Chas. H., 1347 N. Front St., Philadelphia, Pa. "A 1."

REX—See Nesmith Co.

REXINE Co., 725 New York Ave., Sheboygan, Wis.

RITE OFF—See Bates, Howard M.

ROBERTSON Co., J. T., Manchester, Conn. "Vanco."

ROME Soap Mfg. Co., Rome, N. Y.

SHOFO—See Stanley, John T.

SAPONAL Chemical Co., Park Ave. & 130th St., New York, N. Y. "Ol-Se-Co."

SKAT Mfg. Co., 791 Park St., Hartford, Conn.

SKIDOO—See Yeazell-Goldstein Corp.

SMITH, F. L., Lee, Ill.

SOP-O-ZON—See Bobrick Chemical Co.

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HAND SOAPS AND PASTES (Continued)

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Shofo."

TATLOCK Bros., Rochester, N. Y. "Tat's."
(See page 655.)

TAT'S—See Tatlock Bros.

UNEEDIT—See Cross, W. H.

UTILITY Co., 639 W. 44th St., New York, N. Y. "Gre-Solvent."

VANCO—See Robertson Co.

WALTKE & Co., Wm., Grand Ave. & Second St., St. Louis, Mo. "Lava."

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Cleansum."

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Cleaneasy."

YEAZELL-GOLDSTEIN Corp., Michigan and Buttles Ave., Columbus, O. "Skidoo."

SOCKETS

BOW SOCKETS

(See also Irons, Slat)

AJAX—See Cortland Forging Co.

ASHTABULA Bow Socket Co., Ashtabula, O.
(See page 689.)

CINCINNATI Bow Socket Co., Cincinnati, O.

CLEVELAND Hardware Co., 45th St. & Lakeside Ave., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y. "Ajax."

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer."

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich.

PIONEER—See Crandal, Stone & Co.

SCHERER & Co., H., Detroit, Mich.

FLAGPOLE SOCKETS AND HOLDERS

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

MARINE Hardware Co., Peabody, Mass.

NEPTUNE Hardware Mfg. Co., 54 South St. New York, N. Y.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

MINIATURE ELECTRIC LAMP SOCKETS

ARSENO Electric Co., 819A Boylston St., Boston, Mass.

ELBA—See Willard Storage Battery Co.

GENERAL Electric Co., Schenectady, N. Y.

HOWARD Miniature Lamp Co., 327 Academy St., Newark, N. J.

McCANDLESS & Co., H. W., 67 Park Pl., New York, N. Y.

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

WILLARD Storage Battery Co., Marquette & Lakeside Aves., Cleveland, O. "Elba."

SPARS

AEROPLANE SPARS.

CHICAGO Embossed Moulding Co., 1338-49 Clybourne Pl., Chicago, Ill.

CLEANERS Mill, 245-47 E. 28th St., New York, N. Y.

STRATTON, H. C., 741 Boylston St., Boston, Mass.

ZORN Mfg. Co., 1119 W. Third St., Dayton, O.

MOTOR BOAT SPARS

NEW York Boat Oar Co., 69 West St., New York, N. Y.

PALMER Boat Co., Fontana, Wis.

PETERSEN, Julius, Nyack, N. Y.

PIGEON Hollow Spar Co., 131 Coleridge St., Boston, Mass.

SPEEDOMETERS

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

AUTOMATIC Appliance Co., 1919 Broadway, New York, N. Y.
(See page 623.)

AUTO-METER—See Warner Instrument Co.

BULLARD Specialty Co., 778 State St., Springfield, Mass.

CLEVELAND Speed Indicator Co., 1806 Euclid Ave., Cleveland, O.
(See page 763.)

ELECTRIC Speedometer Co., Washington, D. C. "Hopkins."
(See page 389.)

EVER READY—See American Ever Ready Co.

FORSE Mfg. Co., 1213 Main St., Anderson, Ind.
(See page 623.)

HOFFECKER Co., Motor Mart, Boston, Mass.
(See page 749.)

HOPKINS—See Electric Speedometer Co.

INDEX Speed Indicator Co., 800 Hennepin Ave., Minneapolis, Minn.

JONES Speedometer Co., New Rochelle, N. Y.

NATIONAL Speed Indicator Co., 147 Columbus Ave., Boston, Mass.

OLIVER—See Stecker Electric & Machine Co.

RECORDING Speedometer Sales Co., 225 Halsey St., Newark, N. J.

RELIANCE Speedmeter Co., 134 Eliot St., Boston, Mass.

SEARS-CROSS Co., 685 11th Ave., New York, N. Y.

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass.
(See page 623.)

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The Hopkins Electric Speedometer is fastened to the dash; The Electrodometer or trip odometer is carried in the hand or pocket in any part of the car. Both are operated electrically. No noisy, troublesome flexible shafting like on all other speedometers. The Hopkins Electric Speedometer is accurate to the fraction, reads absolutely steady always, and is unaffected by temperature changes.

The Electrodometer registers each tenth of a mile accurately, the figures jumping into plain view instantly. It can be quickly reset forward or backward at any time to any reading from one-tenth mile to 999.9 miles. Runs quiet as a watch.

The "Blue Book" Route Cars are officially equipped with the Hopkins Electric Speedometer and The Electrodometer. Booklet gives complete description of both instruments. Send for it.

ELECTRIC SPEEDOMETER CO., Washington, D. C.

New York Branch, 1999 Broadway

Massachusetts: White, Ware & Co., 1024 Boylston Street, Boston
Connecticut: Fairfield Auto Co., Bridgeport
Maryland: The White Automobile Co., Mt. Royal and Guilford Avenues, Baltimore

With your road map and

THE ELECTRODOMETER

before you, no better guide is needed.

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SPEEDOMETERS (Continued)

STAR Speedometer Co., Milton, Pa.

STECKER Electric & Machine Co., 34-36 Bates St., Detroit, Mich. "Oliver."

STEWART & Clark Mfg. Co., 1828-48 Diversey Blvd., Chicago, Ill. (See page 229.)

STOVER-LANG Co., 219-23 Columbus Ave., Boston, Mass.

TROY Carriage Sun Shade Co., Troy, O.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

WARNER Instrument Co., Beloit, Wis. "Auto-Meter." (See page 667.)

SPOKES

WIRE SPOKES

STANDARD Co., 52 Norwood St., Torrington, Conn.

WIRE Goods Co., 16-28 Union St., Worcester, Mass.

SPONGES

SPONGES AND CHAMOIS

CARBONDALE Calcium Co., Carbondale, Pa.

GREEK American Sponge Co., Franklin & Randolph Sts., Chicago, Ill. (Importers.)

NIEHAUS Co., Jos., 341 W. Fourth St., Cincinnati, Ohio. (Importers.)

SMITH, Kline & French Co., 429 Arch St., Philadelphia, Pa.

STANDARD Sponge & Supply Co., 2527-29 Homer St., Chicago, Ill. (Importers.)

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill. (Importers.) (See page 459.)

SPRAGS

DROP SPRAGS

(See Brakes, Drop)

SPRINGS

LEAF SPRINGS

AMERICAN Spiral Spring Mfg. Co., 56th & Butler Sts., Pittsburg, Pa.

ANSTED Spring & Axle Co., Connersville, Ind.

ARMSTRONG Mfg. Co., J. B., Flint, Mich.

BUCKEYE Spring Works, 1919 Race St., Cincinnati, O.

CHAMP Spring Co., St. Louis, Mo.

CINCINNATI & Hammond Spring Co., 909-23 Summer St., Cincinnati, O.

CLEVELAND-CANTON Spring Co., Canton, O. (See page 733.)

COOPER Spring Co., Main Ave. & Center St., Cleveland, O.

DELANY & Son, D., Liberty & Hamilton Sts., Newark, N. J.

DETROIT Steel Products Co., Boulevard & Griffin St., Detroit, Mich.

DRAGON—See Sheldon Axle Co.

FORT Pitt Spring & Mfg. Co., Farmers' Bank Bldg., Pittsburg, Pa.

FOWLER—See National Spring Co.

GARDEN CITY Spring Works, E. 20th St & Santa Fe R. R., Chicago, Ill.

HARVEY Spring Co., Box 34, Racine, Wis. (See page 391.)

HESS-PONTIAC Spring & Axle Co., Pontiac, Mich. (See page 709.)

HESS Spring & Axle Co., Carthage, O.

HIGGINS Spring & Axle Co., Racine, Wis. (See page 393.)

INSULL, Thomas, 1439 Hutchinson St., Philadelphia, Pa.

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers.) "Lemoine." (See pages 613 and 709.)

IRON City Spring Co., 510 Allegheny Ave., (North Side), Pittsburg, Pa.

KALAMAZOO Spring & Axle Co., Portage St., Kalamazoo, Mich.

KEYSTONE Spring Works, 1301 Buttonwood St., Philadelphia, Pa.

KOEHLER—See Universal Auto Spring Co.

KRUPP—See Prosser & Son.

LEMOINE—See International Engineering Co.

LEWIS Spring & Axle Co., Jackson, Mich. (See page 574.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa. (See page 73.)

MARBURG Bros., 1777 Broadway, New York, N. Y. (Importers.) "Marburg-Hagen."

MARBURG-HAGEN—See Marburg Bros.

MERRILL Spring Co., E. R., 530 West 28th St., New York.

NATIONAL Spring Co., New Castle, Ind., "Fowler."

PALMER, Jos., 333 Rutherford Ave., Boston, Mass.

PENN Spring Works, Baldwinsville, N. Y.

PERFECTION Spring Co., Cleveland, O. (See page 391.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

ROWLAND, Wm. & Harvey, Frankfort, Philadelphia, Pa.

ST. Louis Supplementary Spiral Spring Co., 4523 Delmar Ave., St. Louis, Mo.

SHELDON Axle Co., Wilkes-Barre, Pa. "Dragon." (See pages 66 and 67.)

SPRING Perch Co., 232 John St., Bridgeport, Conn.

TRIPLE Action Spring Co., 215-17 E. 21st St., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 22.

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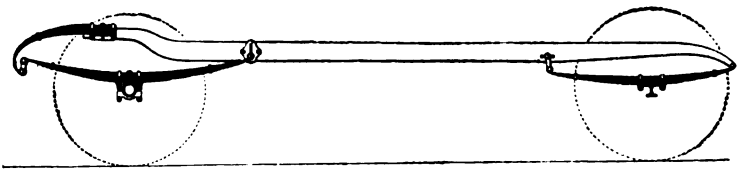
THE PERFECTION SPRING COMPANY

AUTO SPRING SPECIALISTS

CLEVELAND, OHIO



OUR NAME HAS BECOME A SYNONYM FOR QUALITY IN SPRINGS

Low-Cambered—Semi-Elliptic

ANY TYPE TO ORDER FROM

VANADIUM, KRUPP AND CRUCIBLE } STEEL

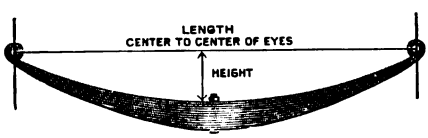
Send Us Your Spring Troubles

Harvey Auto Springs

All Styles and Shapes Made to Order

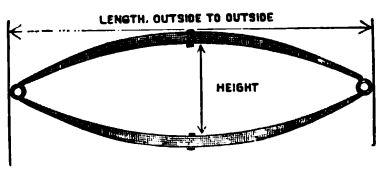
The best that good steel, experience, modern facilities and skilled workmen can make. All springs are tested before leaving the factory and a careful record kept for future reference.

We are glad to give you the benefit of our experience in designing springs for new cars.



The way to measure a Half Spring

Give size of eye bolt and note whether center bolt is in center or out of center. If out of center give length of each end of spring.



The way to measure an Elliptic Spring

Always give the width of the spring, the number of leaves and the combined thickness of the leaves.

It is also well to give make and model of car. If measurements are carefully given we can replace any spring. Prompt attention and reasonable prices.

HARVEY SPRING CO. Box 34 RACINE, WIS.

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SPRINGS (Continued)

LEAF SPRINGS (Continued.)

TROY Spring Works, 394-96 Congress St., Troy, N. Y.

TUTHILL Spring Co., 766 Polk St. Chicago, Ill.
(See page 455.)

UNIVERSAL Auto Spring Co., Florrisant & Goodfellow Aves., St. Louis, Mo. "Koehler."

WATERTOWN Spring Works, Watertown, N. Y.

MACHINERY SPRINGS

AMERICAN Spiral Spring Mfg. Co., 56th & Butler Sts., Pittsburg, Pa.

AMERICAN Steel & Wire Co., Chicago, Ill.
(See page 725.)

BARNES Co., Wallace, Bristol, Conn.

BOYD Steel Springs Co., 505-13 State St., Brooklyn, N. Y.
(See page 455.)

BRIDGEPORT Chain Co., Crescent Ave., Bridgeport, Conn. "Perfection."

CARY Spring Works, 240 W. 29th St., New York, N. Y.

CHATILLON & Sons, John, 85-93 Cliff St., New York, N. Y.

CLEVELAND Wire Spring Co., Cleveland, O.

DUNBAR Bros. Co., Bristol, Conn.
(See page 395.)

EAGLE—See Miller & Van Winkle.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

FISCHER Spring Co., Chas., 88-90 Walker St., New York, N. Y.

FORT Pitt Spring & Mfg. Co., Farmers' Bank Bldg., Pittsburg, Pa.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 393.)

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HEBB, George A., 70 William St., Newark, N. J.

HUBBARD Spring Co., M. D., Pontiac, Mich.
(See page 393.)

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

INTERNATIONAL Engineering Co., 1779 Broadway, New York, N. Y. (Importers). "Lemoine."
(See pages 613 and 709.)

LEMOINE—See International Engineering Co.

MANROSS & Sons, F. N., Forestville, Conn.

MILLER Wire Spring Co., Bridgeport, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y. "Eagle."

MORGAN Spring Co., Worcester, Mass.
(See page 393.)

NEW York Wire & Spring Co., 586 Washington St., New York, N. Y.

PERFECTION—See Bridgeport Chain Co.

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

RAYMOND Mfg. Co., W. Church St., Corry, Pa.

SABIN Machine Co., Montpelier, Vt.

TUCK Mfg. Co., 74 Ames St., Brockton, Mass.

SEAT OR UPHOLSTERY SPRINGS

BARBER Mfg. Co., Anderson, Ind. "Cardinal."
(See page 701.)

BARNES Co., Wallace, Bristol, Conn.

BLACK VELVET—See National Spring & Wire Co.

CARDINAL—See Barber Mfg. Co.

CLEVELAND Wire Spring Co., Cleveland, O.

D'ARCY Spring Co., Kalamazoo, Mich.
(See page 455.)

DEAN & Co., Henry E., 180 Austin Ave., Worcester, Mass.

DETROIT Wire Spring Co., Detroit, Mich. "Royal Arch."
(See page 455.)

EXCELSIOR—See Trenton Spring & Mattress Co.

FOSTER Bros. Mfg. Co., Utica, N. Y.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 393.)

HUBBARD Spring Co., M. D., Pontiac, Mich.
(See page 393.)

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

JACKSON Cushion Spring Co., Jackson, Mich.
(See page 733.)

KELLEY & Co., E., 509 Main St., Worcester, Mass. "Union."

LACE WEB—See Trenton Spring & Mattress Co.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

MILLER Wire Spring Co., Bridgeport, Conn.

MORGAN Spring Co., Worcester, Mass.
(See page 393.)

MURRAY Spring Co., Wm. A., 132 Sycamore St., Cincinnati, O.

NATIONAL Spring & Wire Co., Albion, Mich. "Black Velvet."

RADERMACHER, John L., 16 Horatio St., New York, N. Y.

ROUGH RIDER—See Ventilated Cushion & Spring Co.

ROYAL ARCH—See Detroit Wire Spring Co.

STAPLES & Hanford Co., Newburgh, N. Y.

TRENTON Spring & Mattress Co., Trenton, N. J. "Excelsior," "Lace Web."

UNION—See Kelley & Co.

VENTILATED Cushion & Spring Co., Jackson, Mich. "Rough Rider."

WING Co., Charles, Amesbury, Mass.
(See page 733.)

SUPPLEMENTARY SPRINGS

(See Shock Absorbers)

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SPRINGS

MACHINERY, SEAT AND UPHOLSTERY SPRINGS

made from round wire or flat steel.

HIGHEST QUALITY obtainable. Best suited for **AUTOMOBILES**

We make Wire and Springs of

VANADIUM STEEL

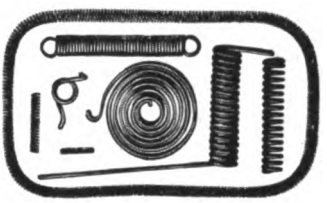
Consult the oldest spring concern in the country concerning your wants

MORGAN SPRING CO., WORCESTER, MASS.

SPECIAL SMALL, FLAT SPRINGS

OF ANY SHAPE FOR ANY PURPOSE

Coil Springs
Extensions



Compression
Torsion

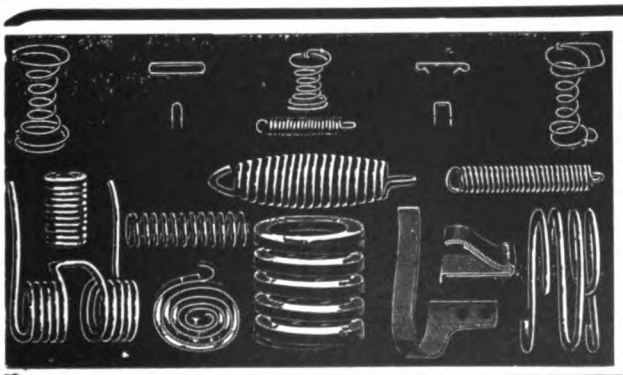
M. D. HUBBARD SPRING COMPANY, Pontiac, Michigan

AUTOMOBILE SPRINGS

EASY RIDING QUALITIES COUPLED WITH
GREATEST STRENGTH AND
FLEXIBILITY

Made from Vanadium, Nickel Chrome and Vanadium Steel.
Springs carefully tested. Heat treated. Expert workmanship, etc.

HIGGINS SPRING & AXLE CO. **RACINE, WIS.**



The Wm. D. Gibson Co.

Huron & Kingsbury Sts., Chicago

SPRINGS

SPIRAL and FLAT

Steel, Brass and Phosphor Bronze

Special Shapes and Sizes to meet all requirements of Automobile Makers.

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SPROCKETS

MACHINED SPROCKETS

(For Sprocket Blanks—See Castings; also Forgings; also Gears, Blank)

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 175.)

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 205.)

BROWN-LIPE Gear Co., 200 S. Geddes St., Syracuse, N. Y.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CARPENTER-KERLIN Gear & Machine Co., 77 White St., New York, N. Y.
(See page 363.)

COLLMER Bros., 105 Vistula Ave., South Bend, Ind.

CULLMAN Wheel Co., 1350 Greenwood Terrace, Chicago, Ill.
(See page 395.)

DIAMOND Chain & Mfg. Co., 231 West Georgia St., Indianapolis, Ind.
(See page 141.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

FORG, Peter, 50 Park St., Somerville, Mass.

GRANT Gear Works, 6 Portland St., Boston, Mass.

KRUPP—See Prosser & Son.

MUNCIE Gear Works, Muncie, Ind.
(See page 619.)

PARISH & Bingham Co., Cleveland, O.
(See page 195.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 671.)

THROOP Perforating Co., 80 Terrace, Buffalo, N. Y.

MOTOR CYCLE SPROCKETS

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 175.)

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 205.)

CULLMAN Wheel Co., 1350 Greenwood Terrace, Chicago, Ill.
(See page 395.)

FORG, Peter, 50 Park St., Somerville, Mass.

HYDRAULIC Pressed Steel Co., Cleveland, O.
(See inside back cover.)

PARISH & Bingham Co., Cleveland, O.
(See page 195.)

GREAT Western Mfg. Co., La Porte, Ind.

STAMPINGS

STEEL STAMPINGS

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 269.)

ATLAS Stamping Co., 557-61 Jackson Blvd., Chicago, Ill.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BAY State Stamping Co., 880 Chandler St., Worcester, Mass.

BETTCHER Mfg. Co., Cleveland, O.
(See page 625.)

BLAIR Tool & Machine Works, 24-27 West St., New York, N. Y.

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I.
(See page 625.)

BOSSERT Co., Utica, N. Y.
(See page 755.)

BOSTON Pressed Metal Co., 171-73 Union St., Worcester, Mass.

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y.
(See page 171.)

BRONSON-WALTON Co., Cleveland, O.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.
(See page 351.)

CROSBY Co., Buffalo, N. Y.
(See page 227.)

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 363.)

CULVER-STEARNS Mfg. Co., 34 Southbridge St., Worcester, Mass.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 243.)

DOMINION Stamping Co., Walkerville, Ont., Can.
(See page 221.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 227.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

FORG, Peter, 50 Park St., Somerville, Mass.

FRIES & Co., Buffalo, N. Y.
(See page 725.)

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HAYES-IONIA Co., Ionia, Mich.

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HILL Co., Geo. Q., 326 A St., Boston, Mass.

HOUGHTON Mfg. Co., 81-89 Exchange St., Worcester, Mass.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 22.

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ESTABLISHED 1845
THE DUNBAR BROTHERS CO.
MANUFACTURERS OF
STEEL (OIL TEMPERED) SPRINGS
ALL KINDS OF
SMALL SPRINGS
MADE FROM SHEET STEEL & STEEL & BRASS WIRE
BRISTOL, CONN.

Cullman Sprockets
For Diamond, Baldwin and Whitney Chains
Differentials
Sprockets in stock and to order
Cullman Wheel Co.
1350 Greenwood Terrace
Chicago
OIL RETAINER
PATENTED SEPT 19 05
OTHER PATENTS PENDING

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STAMPINGS (Continued)

STEEL STAMPINGS (Continued.)

HYDRAULIC Pressed Steel Co., Cleveland, O.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JANNEY, Steinmetz & Co., Philadelphia, Pa.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

KRUPP—See Prosser & Son.

LINDHOLM Metal Stamping, Co., 111 Erie St., Camden, N. J.
(See page 171.)

MATHEWS Mfg. Co., H. A., Seymour, Conn.

MATTHEWS Mfg. Co., Worcester, Mass.

MAYER Co., Chas. W., 187 N. Water St., Rochester, N. Y.

METAL Blanks Co., 5315 Euclid Ave., Cleveland, Ohio.

METAL Specialty Co., Cincinnati, Ohio.
(See page 625.)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.
(See page 221.)

MOLINE Stamping Co. (E. Moline), Moline, Ill.

MONROE Electric Mfg. Co., Box 57, Monroe, Mich.
(See page 631.)

MORGAN Spring Co., Worcester, Mass.
(See page 393.)

MOSSBERG Co., Frank, Attleboro, Mass.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.
(See page 419.)

OMEGA Separator Co., Lansing, Mich.
(See page 605.)

PARISH & Bingham Co., Cleveland, O.
(See page 195.)

PARKER Co., John L., 62 Jackson St., Worcester, Mass.

PARKER White Metal & Machine Co., Erie, Pa.
(See page 317.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

ROYAL Enameling & Stamping Works, Desplaines, Ill.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 651.)

S. & I. Co., 53-55 Governor St., Springfield, Mass.

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SMITH Co., A. O., Milwaukee, Wis.
(See page 397.)

SMITH Co., Thos., 13 Cypress St., Worcester, Mass.

SNOW Co., Benjamin W., 132 Bissell St., Syracuse, N. Y.
(See page 755.)

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 574.)

STAR Ball Retainer Co., Lancaster, Pa.
(See page 113.)

STEARNS Stamping Co., W. H., 34 Southbridge St., Worcester, Mass.

STERLING Machine & Stamping Co., Wellington, O.

STOLL Pressed Steel Co., Buffalo, N. Y.

SYRACUSE Metal Stamping Co., Syracuse, N. Y.

TURNER Brass Works, Sycamore, Ill.

VULCAN Mfg. Co., 1920 W. Kinzie St., Chicago, Ill.

W. & S. Mfg. Co., 12 Hunt St., Worcester, Mass.

WALTER & Sons, N. C., 194 William St., New York, N. Y.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

STANDS

MOTOR CYCLE STANDS

ADAMS Co., Henry T., 6823 S. Chicago Ave., Chicago, Ill. "Quick Action."

EXCELSIOR Supply Co., Chicago, Ill.

MAJESTIC Mfg. Co., 34 Southbridge St., Worcester, Mass.

PATTERSON, A. H., 1080-82 Bedford Ave., Brooklyn, N. Y.

QUICK ACTION—See Adams Co.

SWENSON, B. A., 298 Blackstone St., Providence, R. I.

REPAIR LAMP STANDS

(For holding lamp in any position when making repairs at night)

ARNOLD Auto Specialty Co., Garfield, N. J. "Fixal-Nite."

FIXAL-NITE—See Arnold Auto Specialty Co.

WASH STAND LIGHT STANDS

(See Lights, Wash Stand)

STARTERS

AUTOMATIC GAS ENGINE STARTERS

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

AUTOMATIC Starter Co., 1355 Michigan Ave., Chicago, Ill.

EVER READY—See American Ever Ready Co.

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110,000 Pressed Steel Automobile Frames

Our Output

August 1st, 1909, to August 1st, 1910

OVER 110,000 frames actually shipped during the past year is a record of which we are justly proud. Our customers include 60 per cent of the reliable motor car makers of America, and they attest the splendid service we give and the excellent quality of our workmanship, recognizing the fact that a "SMITH" frame is a distinct mark of quality and a valuable selling point for their agents. The great capacity of our new plant (1,000 frames per day) enables us to take on additional business for the coming year, and we extend to you the opportunity to enhance the value of your car by the use of a "SMITH" frame.

Send blue prints for quotations

A. O. SMITH COMPANY

FRAMES
AXLES
CLUTCHES

MILWAUKEE
WIS.

TRANSMISSIONS
STEERING COLUMNS
STAMPINGS

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STARTERS (Continued)

AUTOMATIC GAS ENGINE STARTERS (Continued.)

GARDNER Engine Starter Co., 1451-55 Michigan Ave., Chicago, Ill.

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y. (See page 653.)

GRISCO—See Ignition Starter Co.

IGNITION Starter Co., Grand Rapids, Mich. (See page 645.)

MARKHAM Co., W. D., Clarksdale, Miss.

MILNE—See Motor Appliances Co.

MOTOR Appliances Co., 1302 Woodward Ave., Detroit, Mich. "Milne."

NORTH East Electric Co., 348 Whitney St., Rochester, N. Y.

STAR Starter Co., 147-51 W. 49th st., New York, N. Y. (See page 729.)

STARTER Mfg. Co., S. Front & Watson Sts., Grand Rapids, Mich.

STEEL

DEALERS IN STEEL

(This is a List of Dealers in Iron, Steel and other metals who advertise in this publication)

BRAUN, J. G., 615-21 S. Paulina St., Chicago, Ill. (See page 639.)

CLEVELAND Tool & Supply Co., Cleveland, O. (See page 447.)

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y. (See page 447.)

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O. (See page 675.)

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass. (See page 445.)

ANGLE, CHANNEL AND TEE IRON OR STEEL

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

EASTERN Steel Co., Pottsville, Pa.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

INLAND Steel Co., 1st National Bank Bldg., Chicago, Ill.

JONES & Laughlin's Steel Co., Pittsburg, Pa.

LOCKHART Iron & Steel Co., McKees Rocks, Pa.

LOGAN Iron & Steel Co., North American Bldg., Philadelphia, Pa.

PENNSYLVANIA Steel Co., Broad & Chestnut Sts., Philadelphia, Pa.

PHOENIX Iron Co., 410 Walnut St., Philadelphia, Pa.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

BAR IRON OR STEEL

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

INLAND Steel Co., 1st National Bank Bldg., Chicago, Ill.

JONES & Laughlins Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

LOCKHART Iron & Steel Co., McKees Rocks, Pa.

LOGAN Iron & Steel Co., North American Bldg., Philadelphia, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PENNSYLVANIA Steel Co., Broad & Chestnut Sts., Philadelphia, Pa.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PHOENIX Iron Co., 410 Walnut St., Philadelphia, Pa.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

SWEET'S Steel Co., Williamsport, Pa.

SHEET STEEL

AMERICAN Sheet & Tin Plate Co., Frick Bldg., Pittsburg, Pa.

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers). (See page 401.)

CARNAHAN Tin Plate & Sheet Co., Canton, O.

FOLLANSBEE Bros. Co., Third & Liberty Aves., Pittsburg, Pa.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

KRUPP—See Prosser & Son.

LA Belle Iron Works, Steubenville, O.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

McVOY Sheet & Tin Plate Co., 344-50 W. Michigan St., Chicago, Ill.

PARKERSBURG Iron & Steel Co., Parkersburg, W. Va.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

TAYLOR Co., N. & G., 308 Chestnut St., Philadelphia, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

Complete Index to Classification appears on Pages 8 to 22.

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THE FAMOUS

Lindenberg Electro Steel

Can Now Be Had In This Country

NICKEL CHROME STEELS with elastic limits above 250,000 lbs. per square inch in the annealed state, suitable for oil tempering or case hardening; in billets, plates, slabs, bars or seamless, slant-rolled tubing.

NICKEL STEEL with from 2 to 35 per cent. Nickel.

CHROME STEEL for balls and ball bearing raceways in billets, bars and seamless, slant-rolled tubing.

MAGNET STEEL of greatest permanency and highest coercive ability.

Molybdenum, Vanadium, Tungsten and **Silicon** Steel.

Electro Tool Steel, Electro High Speed Steel of the very highest quality and for every purpose.

Lindenberg Electro Steel is being used extensively by leading German manufacturers of motor cars, ball bearings, magnetos, etc.

THE LINDENBERG STEEL CO.

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Grand Prizes

World's Fair, Liège, 1905
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NEW YORK

Selling Agents for U. S. A. of the Stahlwerke Rich. Lindenberg, A. G., Remscheid-Hasten, Germany.

THE PIONEER MAKERS OF ELECTRO STEEL

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STEEL (Continued)

COLD ROLLED BAR STEEL

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

COLUMBIA Steel & Shafting Co., Pittsburg, Pa.

COMPRESSED Steel Shafting Co., 393 Dorchester Ave., Boston, Mass.

CRUCIBLE Steel Co., of America, Oliver Bldg., Pittsburg, Pa.

CUMBERLAND Steel Co., Williams St. & B. & O. R. R., Cumberland, Md.

JONES & Laughlin's Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

PARDEE Works, C., Perth Amboy, N. J.

PITTSBURG Shafting Co. of Detroit, Detroit, Mich.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 685.)

COLD ROLLED STRIP STEEL

AMERICAN Steel & Wire Co., Chicago, Ill. (See page 725.)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CARPENTER Steel Co., Reading, Pa.

COLUMBIA Steel Co., Elyria, O.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

ELLIOTT-BLAIR Steel Co., Taylor & Mercer Sts., Newcastle, Pa.

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

MORRIS & Bailey Steel Co., Pittsburg, Pa.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

STANLEY Works, Lake St., New Britain, Conn.

SUPERIOR Steel Co., Carnegie, Pa.

WALKER & Co., Wm. J., 1722 Columbus Rd., N. W., Cleveland, O.

WEST Leechburg Steel Co., Farmers Bank Bldg., Pittsburg, Pa.

TOOL STEEL

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

AMERICAN Import & Export Co., 346 Broadway, New York, N. Y. (Importers.)

ATLAS Steel Co., Dunkirk, N. Y.

BECKER Steel Co., 90 West St., New York, N. Y. (Importers.)

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BRAEBURN Steel Co., Braeburn, Pa.

BROWN & Co., 10th St. & Duquesne Way, Pittsburg, Pa.

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers). (See page 401.)

CARPENTER Steel Co., Reading, Pa. "Comet."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

COMET—See Carpenter Steel Co.

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y. (Importers). (See page 639.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, Titusville, Pa.

DAMASCUS Crucible Steel Casting Co., New Brighton, Pa.

DAMASCUS Tool Steel Co., 32d & Smallman Sts., Pittsburg, Pa.

DANNEMORA—See Ward & Sons.

ELLIOTT, H. A., 701 American Trust Bldg., Cleveland, O. (Importers.) (See page 537.)

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FIRTH-STERLING Steel Co., McKeesport, Pa.

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y. (Importers.) "Poldi." (See page 447.)

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

LUDLUM Steel & Spring Co., Watervliet, N. Y.

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

NEW Metal Tool Steel Co., Portland, Me.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PITTSBURGH Tool Steel Wire Co., Monaca, Pa.

POLDI—See Frasse & Co.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. (See page 685.)

VULCAN Crucible Steel Co., Main St., Alliquippa, Pa. (See page 479.)

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass. (Importers.) "Dannemora." (See page 445.)

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Cammell Laird & Co., Ltd.

SHEFFIELD, ENGLAND

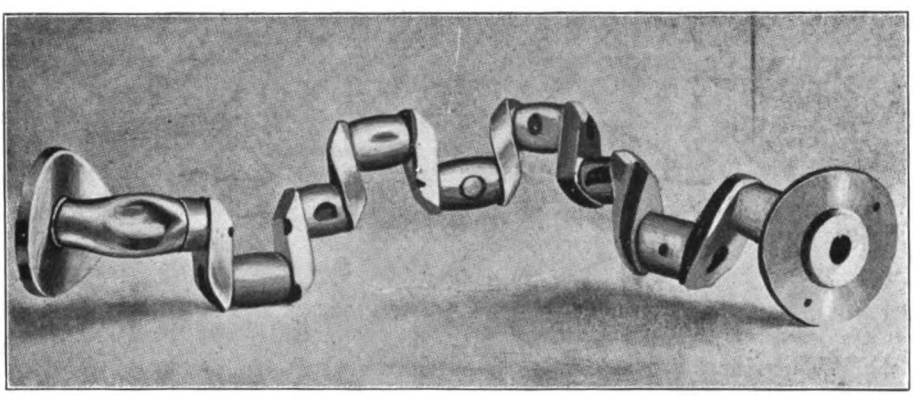
Sole Agents for Steel in the United States
LIONEL & MONTAGU SAMUEL

Special High Tenacity

Chrome Nickel Steel

for all VITAL PARTS of an Automobile that does not BREAK or BEND.

Needs NO TREATMENT before or after machining, and MACHINES READILY with SHARP TOOLS in the hands of EXPERT MECHANICS.



Motor Crank Shaft of High Tenacity Steel, Battered Cold in Order to Prove its Great Toughness.

Also NICKEL STEEL of any percentage of Nickel for AUTOMOBILE and ELECTRICAL WORK.

SPECIAL CRUCIBLE steels for all requirements that are ALWAYS UNIFORM, of every grade and temper as required.

Made to order and carried in special sizes required by customers.

H. R. D. High Speed Steel

The TOUGHEST and STRONGEST HIGH SPEED STEEL known, having a wider range of usefulness than any other.

Cyclops No. 2

An extra quality of tool steel for all general purposes, for which we challenge comparison with any steel on the market.

Warehouse: 34 Cliff St., New York City

Sub-Agencies Where Stocks Are Carried: Chicago, Boston, Philadelphia, Pittsburgh, Cleveland, Buffalo, Cincinnati, Bridgeport, New Haven, Rochester, St. Louis, Indianapolis, Montreal, Providence, Syracuse, Toronto

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STEEL (Continued)

SPRING STEEL

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

ARROW—See Crowley Co.

BRAEBURN Steel Co., Braeburn, Pa.

CAMBRIA Steel Co., Arcade Bldg., Philadelphia, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) "Arrow."
(See page 639.)

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HELMUTH Co., L., 22 State St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

PENNSYLVANIA Steel Co., Broad & Chestnut Sts., Philadelphia, Pa.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

SWEETS Steel Co., Williamsport, Pa.

VULCAN Crucible Steel Co., Main St., Alliquippa, Pa.
(See page 479.)

MANGANESE STEEL

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers.)
(See page 401.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.)
(See page 399.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

UNITED Steel Co., Canton, O.
(See page 405.)

NICKEL STEEL

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

AMERICAN Import & Export Co., 346 Broadway, New York, N. Y. (Importers.)

BECKER Steel Co., 90 West St., New York, N. Y. (Importers.)

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers.)

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers.)
(See page 401.)

CARBON Steel Co., 32d and Smallman Sts., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa.

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.)
(See page 639.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

DAMASCUS Tool Steel Co., 32d & Smallman Sts., Pittsburg, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y. (Importers.) "Poldi."
(See page 447.)

HALCOMB Steel Co., Syracuse, N. Y.

HELMUTH Co., L., 22 State St., New York, N. Y. (Importers.)

KIDD Bros. & Burgher Steel Wire Co., Alliquippa, Pa.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.)
(See page 399.)

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

PHILADELPHIA Steel & Forge Co. 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 403.)

UNION Drawn Steel Co., Beaver Falls, Pa.
(See page 685.)

VULCAN Crucible Steel Co., Main St., Alliquippa, Pa.
(See page 479.)

CHROME NICKEL STEEL

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

AMERICAN Import & Export Co., 346 Broadway, New York, N. Y. (Importers.)

ARROW—See Crowley Co.

BECKER Steel Co., 90 West St., New York, N. Y. (Importers.)

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers.)
(See page 401.)

CARPENTER Steel Co., Reading, Pa.

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) "Arrow."
(See page 639.)

CRUCIBLE Steel Co. of Amer., Oliver Bldg., Pittsburg, Pa.

ELLIOTT, H. A., 701 American Trust Bldg., Cleveland, O. (Importers.)
(See page 537.)

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y. (Importers.) "Poldi."
(See page 447.)

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

JESSOPS & Sons, Wm., 91 John St., New York, N. Y. (Importers.)
(See page 685.)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

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USE KRUPP STEEL IN YOUR CARS

And Feel Satisfied and Secure

Crank Shafts, Axles, Steering Knuckles, Gears, Frame Members, Shafts and all Forgings for Motor Cars

Carbon Steels
Nickel Steels
Chrome Nickel Steels
Vanadium Steels
Chrome Vanadium Steels
Silicon Manganese Steels
Krupp Steels

Now in Stock at New York:

Round Bars of Krupp Special **Chrome Nickel Steel,** Grade E. F. 60.0 ½" to 8" diameter for Gears, Axle Shafts, etc., having minimum elastic limit, 100,000 lbs. per square inch.

This steel can be oil or case hardened so as to have an elastic limit of over 200,000 lbs. Use this "TOUGHEST STUFF" and eliminate the breakages you are now having.

LOOK TO THE STEEL WORKS

FOR THOMAS PROSSER & SON 15 GOLD ST. NEW YORK Represented by AMERICAN OFFICE. STEEL

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STEEL (Continued)

CHROME NICKEL STEEL (Continued.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.). (See page 529.)

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 685.)

VULCAN Crucible Steel Co, Main St., Alliquippa, Pa. (See page 479.)

VANADIUM STEEL

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

BETHLEHEM Steel Co., S. Bethlehem, Pa.

CARPENTER Steel Co., Reading, Pa.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

EHRENZELLER, G. F., Pennsylvania Bldg., Philadelphia, Pa. (Importers).

HALCOMB Steel Co., Syracuse, N. Y.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 685.)

UNITED Steel Co., Canton, O. (See page 405.)

VANADIUM-Alloys Steel Co., Latrobe, Pa. (See page 685.)

VULCAN Crucible Steel Co, Main St., Alliquippa, Pa. (See page 479.)

ALUMINUM COATED SHEET STEEL

ALUMALOYD Products Co., Canton, O. (See page 681.)

PITTSBURG Steel Specialties Co., 35th & Smallman Sts., Pittsburg, Pa.

COPPER-CLAD STEEL

DUPLEX Metals Co., Chester, Pa.

HIGH-SPEED CUTTING STEEL

ALBION—See Hobson, Houghton & Co.

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

AMERICAN Import & Export Co., 346 Broadway, New York, N. Y. (Importers.)

ANDREW & Co., J. H., 107 West St., New York, N. Y. (Importers.) "Toledo."

ARK—See Jessops & Sons.

ATLAS Steel Co., Dunkirk, N. Y. "Loco."

BETHLEHEM Steel Co., S. Bethlehem, Pa.

BOKER & Co., Hermann, 101 Duane St., New York, N. Y. (Importers.) "Novo."

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers.) (See page 401.)

CAPITAL—See Nash & Co.

CARDINAL—See Elliott, H. A.

CARPENTER Steel Co., Reading, Pa. "Zenith."

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

CROWLEY & Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) (See page 639.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, Titusville, Pa.

ECLIPSE—See New Metal Tool Steel Co.

ELLIOTT, H. A., 701 American Trust Bldg., Cleveland, O. (Importers.) "Cardinal." (See page 537.)

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y. (Importers.) "Poldi." (See page 447.)

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 1 Front St., New York, N. Y. (Importers.) "Albion."

IMPROVED CAPITAL—See Ward & Sons.

INTERNATIONAL High Speed Steel Co., Franklin Square, New York, N. Y.

JESSOPS & Sons, Wm., 91 John St., New York, N. Y. (Importers.) "Ark." (See page 685.)

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers.) "Mushet."

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

LOCO—See Atlas Steel Co.

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co., Nicetown, Philadelphia, Pa.

MUSHET—See Jones & Co.

NASH & Co., Geo., 217 Pearl St., New York, N. Y. (Importers.) "Capital."

NEW Metal Tool Steel Co., Portland, Me. "Eclipse."

NOVO—See Boker & Co.

PHILLIPS & Sons Co., F. R., Penn Bldg., Philadelphia, Pa. (Importers.) "Velos."

POLDI—See Frasse & Co.

RED CUT SUPERIOR—See Vanadium-Alloys Steel Co.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

TOLEDO—See Andrew & Co.

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VANADIUM STEEL

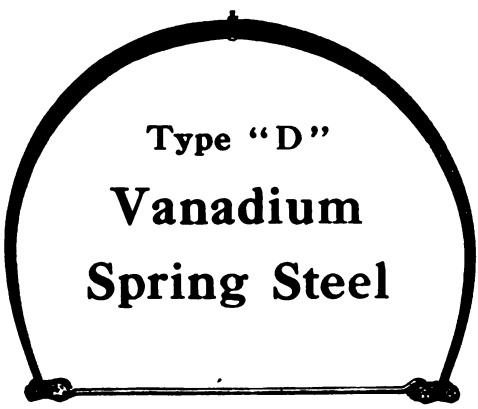
ANTI-FATIGUE PRODUCT

Type A.—Axles, Shafts, Forgings, Gears.
" N.—Clash Gears, Case-Hardening Gears.
" D.—Springs, Crank Pins.

NOTE—Type D Vanadium Steel has an elastic limit of 225,000 lbs. per square inch with tensile strength ranging from 180,000 lbs. to 250,000 lbs. per square inch, heat treated.

BILLETS

PLATES



The Vanadium Spring shown above is reversed 27 inches past a straight line drawn through the center of eye.

SLABS

BARS

Vanadium Steel will carry 80,000 lbs. to square inch without taking a set.

VANADIUM STEEL

THE UNITED STEEL CO., CANTON, OHIO

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STEEL (Continued)

HIGH-SPEED CUTTING STEEL (Continued.)

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Red Cut Superior." (See page 685.)

VELOS—See Phillips & Sons Co.

VULCAN Crucible Steel Co, Main St., Alliquippa, Pa. (See page 479.)

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass. (Importers.) "Improved Capital." (See page 445.)

WARDLOW, S. & C., 278 Pearl St., New York, N. Y. (Importers.)

ZENITH—See Carpenter Steel Co.

SELF-HARDENING CUTTING STEEL

ALLEN & Co., Edgar, 434 W. Randolph St., Chicago, Ill. (Importers.)

AMERICAN Import & Export Co., 346 Broadway, New York, N. Y. (Importers.)

BLUE CHIP—See Firth-Sterling Steel Co.

BOHLERS—See Houghton & Richards.

CAMMELL, Laird & Co., 34 Cliff St., New York, N. Y. (Importers.) (See page 401.)

FIRTH-STERLING Steel Co., McKeesport, Pa. "Blue Chip."

HOBSON, Houghton & Co., 1 Front St., New York, N. Y. (Importers.)

HOUGHTON & Richards, 150 Oliver St., Boston, Mass. "Bohlers."

ILLINGSWORTH Steel Co., John, Frankford, Philadelphia, Pa.

JESSOPS & Sons, Wm., 91 John St., New York, N. Y. (Importers.) (See page 685.)

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers.) "Mushet."

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (See page 399.)

MUSHET—See Jones & Co.

VULCAN Crucible Steel Co, Main St., Alliquippa, Pa. (See page 479.)

STEMS

MOTOR CYCLE HANDLE BAR STEMS

CRESCENT Tool Co., Jamestown, N. Y.

STEPS

FORGED STEPS

(See Forgings Drop),

SPECIAL STEPS AND RUNNING BOARDS

BOSSERT CO., Utica, N. Y. (See page 759.)

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y. "Diamond." (See page 775.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. (See page 243.)

DIAMOND—See Dahlstrom Metallic Door Co.

DOMINION Stamping Co., Walkerville, Ont., Can. (See page 221.)

ENGLISH & Mersick Co., New Haven, Conn.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich. "Hayes-Stanwood." (See pages 94 and 95.)

HAYES-STANWOOD—See Hayes Mfg. Co.

HYDRAULIC Pressed Steel Co., Cleveland, O. (See inside back cover.)

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O. (See page 671.)

METALLIC Automobile Matting Co., 281 Mill St., Rochester, N. Y.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich. (See page 221.)

MOTOR Parts Co., Plainfield, N. J. "Stanwood." (See page 557.)

PARISH & Bingham Co., Cleveland, O. (See page 195.)

STANWOOD—See Motor Parts Co.

STAMPED AND PRESSED STEPS

(See Stampings, Steel)

STONES

OIL STONES

(For cleaning platinum points on Spark Coils)

PIKE Mfg. Co., Pike, N. H.

STOVES

ALCOHOL STOVES

ALCOHOL Utensil & Mfg. Co., 109 Hamilton St., Newark, N. J. "Alpha."

ALPHA—See Alcohol Utensil & Mfg. Co.

DANGLER Stove Co., Cleveland, O.

MANNING, Bowman & Co., Meriden, Conn.

MILDENBERG, S. H., 253 Broadway, New York, N. Y. (Importer.)

STERNAU & Co., S., 80 John St., Brooklyn, N. Y.

COAL STOVES.

RUSSELL & Watson, Buffalo, N. Y.

STAMFORD Foundry Co., Stamford, Conn.

ELECTRIC STOVES

AMERICAN Electrical Heater Co., Detroit, Mich.

GENERAL Electric Co., Schenectady, N. Y.

HADAWAY Electric Heating & Engineering Co., 228 W. Broadway, New York, N. Y.

SIMPLEX Electrical Co., 201 Devonshire St., Boston, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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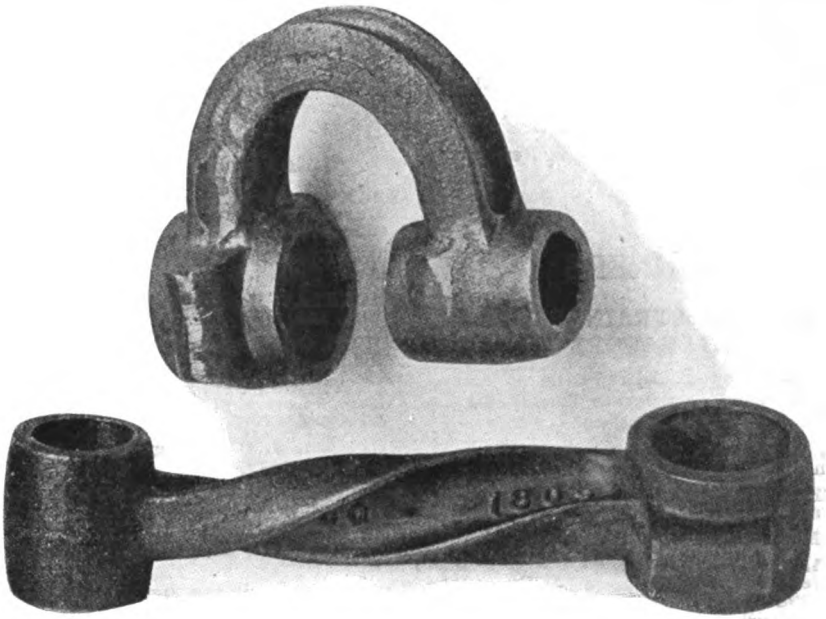

THE twisted connecting rods shown above give a slight idea of the ductility of VICTOR VANADIUM BRONZE.

Hundreds of axles, connecting rods, bushings and other automobile parts have been made from this metal and the principal features proven by years of severe service tests which should induce the automobile manufacturers to standardize VICTOR VANADIUM BRONZE for all parts subjected to excessive shocks and strains and severe wear and tear, are:

TENSILE STRENGTH GREATER THAN MILD CARBON STEEL
INCREASED DUCTILITY AS SHOWN BY ABOVE SPECIMENS
LIGHTER IN WEIGHT THAN ANY OTHER BRONZE CASTING

VANADIUM not only increases the strength and toughness of VICTOR VANADIUM BRONZE but also, by reason of its wonderful faculty as a scavenger, insures a clean and uniform metal with a very close molecular structure.

The ability to resist crystallization is also one of the peculiar characteristics of Vanadium.

This metal can be made strong, hard, tough, or elastic, according to the required conditions. Bearing tests show 100% increased wearing life over other bearing metals.

This Company is prepared to make axles, levers, brakes, connecting rods, bushings, etc., of VICTOR VANADIUM BRONZE and will give prompt shipments.

We make a specialty of VANADIUM ALUMINUM castings and our castings are conceded to be the strongest and most uniform on the market.

Write us for booklet "VANADIUM METALS IN AUTOMOBILE SERVICE."

VANADIUM METALS COMPANY

FRICK BUILDING - - - - - - - PITTSBURGH, PA.

Foundry: East Braintree, Mass.

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STOVES (Continued)

KEROSENE STOVES.

AMERICAN Stove Co. (Ringen Div.), 414 N. Sixth St., St. Louis, Mo.

DANGLER Stove Co., Cleveland, O.

LOVETT Co., A. E., 63 Park Pl., New York, N. Y. "Primus."

PRIMUS—See Lovett Co.

STRAINERS

GASOLINE STRAINERS OR SEPARATORS

(For use between tank and carbureter to remove dirt and water. For Strainer Funnels—See Funnels, Gasoline)

BALL Multi-Spark Plug Co., 7 N. 11th St., Minneapolis, Minn.

BREEZE Carburetor Co., 250-52 South St., Newark, N. J.

ERIE Motor Devices Co., Erie, Pa.

G. & A. Carburettor Co., 244-50 W. 49th St., New York, N. Y.
(See page 647.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANS Motor Equipment Co., La Crosse, Wis.
(See page 187.)

IDEAL—See Phillips, T. L.

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

KRAMER, William J., 246 Van Alst Ave., Long Island City, N. Y.

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 73.)

LUNKENHEIMER Co., 333 E. Eighth St., Cincinnati, O.

MARVEL Carbureter Co., 226A Alvord St., Indianapolis, Ind.
(See page 645.)

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NO-KLOG—See Standard Gasoline Filter Co.

PHILLIPS, T. L., 28 River St., Aurora, Ill. "Ideal."

REYNOLDS, George T., 341-49 Eddy St., Providence, R. I.

STANDARD Gasoline Filter Co., Attleboro, Mass. "No-Klog."

STERLING Machine Co., Norwich, Conn. "Uncas."
(See page 423.)

UNCAS—See Sterling Machine Co.

WATERHOUSE Co., 6 Pelham St., Boston, Mass.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill.
(See page 633.)

WHEELER & Schebler, Shelby & Sanders Sts., Indianapolis, Ind.

WILLIAMS Carbureter Mfg. Co., 963 William St., Buffalo, N. Y.

ZERK Mfg. Co., Columbia Bldg., Cleveland, O.

STRAPS

ANTI-RATTLING HOOD STRAPS

HARTFORD Rubber Works Co., Hartford, Conn.

LEATHER TOP STRAPS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.
(See page 441.)

ARMSTRONG & Graham, 128-32 Jefferson Ave., Detroit, Mich.

BACKSTAY Machine & Leather Co., Union City, Ind.

BUNGE, Otto, 1819 Prospect St., Indianapolis, Ind.

CARTER Co., Geo. R., 1600-20 Kentucky Ave., Connersville, Ind.
(See page 687.)

DECKER, J. C. Montgomery, Pa.
(See page 743.)

DETROIT Leather Works, 31-35 Mullett St., Detroit, Mich.
(See page 85.)

EUSTICE, Bert M., 54-56 Lafayette St., Detroit, Mich.

FEESER Co., Frank S., 1104 Prospect St., Indianapolis, Ind.

GALEWSKI & Son, A., 323 Broadway, New York, N. Y.

GRATON & Knight Mfg. Co., Worcester, Mass.
(See page 385.)

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

KELLEY, A. F., 178 S. Main St., Providence, R. I.

LARAMEE & Grahn, 120 S. Fourth St., Minneapolis, Minn.

MOORE & Steinford, 2317 State St., Chicago, Ill.
(See page 441.)

NATIONAL Leather Mfg. Co., Niles, Mich.

NELSON Co., A. T. A., 2528 Colerain Ave., Cincinnati, O.

PERKINS-CAMPBELL Co., Cincinnati, O.
(See page 411.)

SARTWELL, Heinold & Humphrey, 39 High St., Boston, Mass.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

SPRINGFIELD Harness Co., 27-29 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.

TUTTLE & Clark, Jefferson Ave. nr. Woodward Ave., Detroit, Mich.

WING Co., Charles, Amesbury, Mass.
(See page 733.)

WOLVERINE Leather Goods Co., 59 E. Fort St., Detroit, Mich.

STARTING CRANK STRAPS

(See Holders, Starting Crank)

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Shoot *the* Soot

4 Reasons for Preferring

All-In-One Spark Plugs

You can
Stop that Knocking
Find the Missing
Cylinder
Prime your
Motor Instantly

These exclusive advantages, together with the best construction, materials and workmanship throughout, will show you at once why an ALL-IN-ONE Spark Plug will give you the highest possible efficiency from your ignition.

Price $1.50 Each

Vertical and horizontal types to suit ANY motor.

Especially adapted to Ford, Buick and Reo cars.
To get quick action, pin your check to your order.

Buffalo Carburetor Co.,
DETROIT, MICHIGAN.

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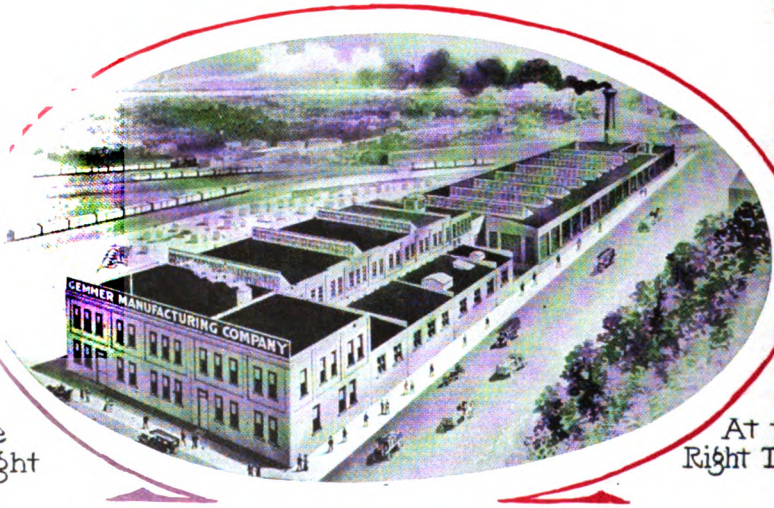
GEMMER STEERING GEARS

Are Dependable, Safe, Simple



Made Right

At the Right Time

The Factory Behind Them

GEMMER MANUFACTURING COMPANY

DETROIT, MICHIGAN

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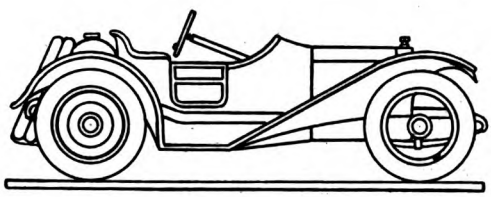
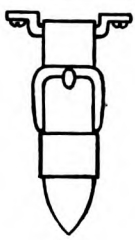
STRAPS





Top Straps
Rebound Straps
Hood Straps
Tire Carrier Straps
Trunk Straps
License Straps
Coat Rail Straps
Crank Boots

Deliveries When Promised

has gained an enviable reputation for us.
Let us figure on your requirements.

Knuckle Boots
End Thrust Boots
Cardinal Joint Boots
Magneto Boots
Door Checks
Imported Pigskin Tool Rolls
Special Work from Specifications or Blue Prints

THE PERKINS CAMPBELL CO.

CINCINNATI

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SUPPLIES

DEALERS IN SUPPLIES

(This is a list of Dealers and Jobbers in Automobile Supplies who advertise in this publication)

AUTOMOBILE Supply Co., 1335 Michigan Ave., Chicago, Ill.
(See page 637.)

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill.
(See page 159.)

M. & M. Co., 414 Prospect Ave., Cleveland, O.
(See page 749.)

NAGEL Electric Co., W. G., Toledo, O.
(See page 421.)

POST & Lester Co., 175 Asylum St., Hartford, Conn.
(See page 637.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y.
(See page 759.)

SHAIN, Chas. D., 1926 Broadway New York, N. Y.
(See page 589.)

WASHINGTON Automobile Supply Co., Washington, Ill.
(See page 631.)

SUPPORTS

HOOD SUPPORTS OR ARCH BARS

CROSBY Co., Buffalo, N. Y.
(See page 227.)

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

METAL Specialty Co., Cincinnati, O.
(See page 625.)

SWITCHES

AUTOMATIC TIME SWITCHES

(For automatically turning the current on or off when charging storage batteries)

ABBOTT Mfg. Co., 2914 Central Ave., S. E., Cleveland, O.

BISSELL Co., F., 226 Huron St., Toledo, O. "Security."

CAMPBELL Electric Co., Lynn, Mass.

DORLAND, Leslie C., Poughkeepsie, N. Y.

ELECTRIC Motor & Equipment Co., 232 Market St., Newark, N. J.

GENERAL Electric Co., Schenectady, N. Y.

LARCHMONT Mfg. Co., Larchmont, N. Y.

McGILL Mfg. Co., Valparaiso, Ind.

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

SECURITY—See Bissell Co.

SORENSEN, P., 18 Dunham Pl., Brooklyn, N. Y.

ELECTRIC SWITCHES

ACME Motor Parts Co., Lafayette, Ind.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

APLCO—See Apple Electric Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. "Aplco."
(See page 639.)

ATWATER Kent Mfg. Works, 44 N. Sixth St., Philadelphia, Pa.
(See page 747.)

CENTRAL Insulating Co., Lafayette, Ind. "Cico."

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy."
(See page 61.)

CICO—See Central Insulating Co.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn.
(See page 369.)

COUCH Co., S. H., 156 Purchase St., Boston, Mass. "Puritan."

COWLES & Co., C., New Haven, Conn.
(See page 351.)

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 679.)

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O.

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."
(See page 747.)

DELCO—See Dayton Engineering Laboratories Co.

DIAMOND H.—See Hart Mfg. Co.

DOW Mfg. Co., Braintree, Mass.

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."
(See page 741.)

EVER READY—See American Ever Ready Co.

FAULTLESS—See Motsinger Device Mfg. Co.

GENERAL Electric Co., Schenectady, N. Y.

GOODSON Electric & Mfg. Co., Providence, R. I.

H. & H.—See Hart & Hegeman Mfg. Co.

H. S. M. Auto Switch Co., Betz Bldg., Philadelphia, Pa. "Means."

HART Mfg. Co., Hartford, Conn. "Diamond H."

HART & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn. "H. & H."

HERZ & Co., Puck Bldg., New York, N. Y.
(See page 335.)

HIGH Frequency Ignition Coil Co., 126½ E. Main St., Los Angeles, Cal. "Seeley."

HOWARD Miniature Lamp Co., 327 Academy St., Newark, N. J.

IDEAL Machine Works, 257 39th St., Brooklyn, N. Y.

IDEAL Switch Co., Plainville, Conn.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass. "Worcester."

MANHATTAN Electrical Supply Co., 17 Park Pl., New York, N. Y.
(See page 615.)

MEANS—See H. S. M. Auto Switch Co.

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

Complete Index to Classification appears on Pages 8 to 22.

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"J.&B." Magnetos and Coils

Perfect Electrically and Mechanically

MADE BY

JACOBSON-BRANDOW COMPANY

PITTSFIELD, MASS. "In the Heart of the Berkshires"

WESTERN SALES OFFICE, 501 Bowles Building, Detroit, Michigan

New York Sales Office, 116 Nassau Street

WIZARD — LIGHTING BATTERIES

MICHIGAN — IGNITION BATTERIES

WIZARD — BATTERY CHARGER

The WIZARD Battery Charger is a new device (not an experiment) that will positively keep your storage battery charged at all times.
The operation of the motor in your car making this possible, and being automatic it needs no attention. Ask us about it.

KNOP BATTERY CO., 60 Atwater St., E. DETROIT, MICH.

VELOS HIGH TENSION MAGNETO

A refined magneto generator of the best construction supplying a permanent source of current at low engine speed and giving a hot spark.

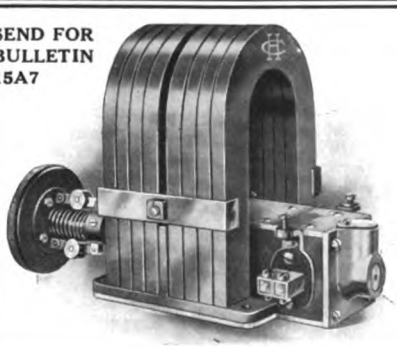
Single or Dual systems with a single set of spark plugs. All parts are strong and will wear indefinitely without requiring any adjustment.

High grade workmanship. Imported Magnets and the best material only.

Write for descriptive matter.

Philadelphia Timer and Machine Co.
51st and Lancaster Ave., Philadelphia, Pa.

SEND FOR BULLETIN 15A7



HOLTZER-CABOT MAGNETOS

JUMP SPARK OR MAKE AND BREAK

For Marine, Stationary and Automobile Engines

Made in several styles and sizes for both systems

The Holtzer-Cabot Electric Co.
BOSTON and CHICAGO

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SWITCHES (Continued)

ELECTRIC SWITCHES (Continued)

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Faultless."

NEW York Coil Co., 338-40 Pearl St., New York, N. Y.

NORTH East Electric Co., 348 Whitney St., Rochester, N. Y.

O'BRIEN & Co., Jos. F., 63 Park Pl., New York, N. Y. (See page 439.)

PERFEX—See Electric Goods Mfg. Co.

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 277.)

PURITAN—See Couch Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

RAPID FIRE—See Tritt Electric Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SEELEY—See High Frequency Ignition Coil Co.

SPLITDORF, C. F., Walton Ave. & 138th St., New York, N. Y. (See page 719.)

TRITT Electric Co., 301 S. Division St., Union City, Ind. "Rapid Fire."

WATRES Mfg. Co., 50 Church St., New York, N. Y.

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., Springfield, Mass. "Wico." (See page 163.)

WORCESTER—See Leland & Co., W. H.

ELECTRIC LOCK SWITCHES

AUTO Lock Co., 950 Adams St., Chicago, Ill.

AUTO-LOCK Plug Co., 31 Nassau St., New York, N. Y.

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn. (See page 369.)

LOXIT Motor Lock Co., 26-30 Marion St., North Tonawanda, N. Y.

MORRIS & Allen, Builders Exchange, Buffalo, N. Y.

NEW York Coil Co., 338-40 Pearl St., New York, N. Y.

RADU Instrument Co., North Tonawanda, N. Y.

SAFETY Device Co., 372 S. Illinois St., Indianapolis, Ind.

WHALEN Lock Co., 293-95 Johnston Ave., Jersey City, N. J.

FOOT SWITCHES

CHICAGO Electric Mfg. Co., 531 Van Buren St., Chicago, Ill. "Handy." (See page 61.)

HANDY—See Chicago Electric Mfg. Co.

HERZ & Co., Puck Bldg., New York, N. Y. (See page 335.)

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., Springfield, Mass. "Wico." (See page 163.)

MOTOR CYCLE HANDLE BAR SWITCHES

BAKER & Co., F. A., 10 Warren St., New York, N. Y. "Simplex."

SIMPLEX—See Baker & Co.

WIDMAYER Co., Frank B., 2312 Broadway, New York, N. Y.

STEERING WHEEL SWITCHES

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

CONNECTICUT Telephone & Electric Co., 34 Britannia St, Meriden, Conn. (See page 369.)

EVER READY—See American Ever Ready Co.

SYSTEMS

ELECTRIC LIGHTING SYSTEMS

ADAMS & Westlake Co., 319 W. Ontario St., Chicago, Ill. "Adlake."

ADLAKE—See Adams & Westlake Co.

APPLE Electric Co., 14 N. Canal St., Dayton, O. (See page 639.)

DUPLEX Electric Co., 13 McWilliams St., Fond-du-Lac., Wis. (See page 771.)

DYNETO Electric Co., Elbridge, N. Y. (See page 415.)

ELECTRO Lighting Co., Board of Trade Bldg., Indianapolis, Ind.

HOLTZER-CABOT Electric Co., Boston, Mass. (See page 413.)

LEONARD Electric Co., Ward, Bronxville, N. Y.

NORTH East Electric Co., 348 Whitney St., Rochester, N. Y.

VESTA Accumulator Co., 1332 Michigan Ave., Chicago, Ill.

TACKS

UPHOLSTERY TACKS

CLEVELAND Tack Works, 1312 E. 49th St., Cleveland, O.

COBB & Drew, Plymouth, Mass.

EAGLE—See Turner & Seymour Mfg. Co.

GENESEE Tack Co., 39-57 Mt. Hope Ave., Rochester, N. Y.

GRAND Crossing Tack Co., (Grand Crossing), Chicago, Ill.

HIGGIN Mfg. Co., Newport, Ky. (See page 183.)

HOBART Co., Benjamin, Whitman, Mass.

MILONITE—See Morley Mfg. Co.

MILWAUKEE Tack Co., Layton Park, Milwaukee, Wis.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

NEW Haven Button Co., 161 Brewery St., New Haven, Conn.

PLYMOUTH Mills, Plymouth, Mass.

RIPLEY & Bartlett, Water St., Plymouth Mass.

SALMOND & Son, Sam, Hanover, Mass.

SHELTON Co., Shelton, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TOWER Mfg. Co., Madison, Ind.

TURNER & Seymour Mfg. Co., Torrington, Conn. "Eagle."

WATERMAN, R. C., So. Hanover, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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Dyneto

An Electric Lighting and Ignition System for your Car

AUTOMATIC—POSITIVE

The Dyneto Automatic Electric Lighting System is specially designed to meet the special requirements of automobile service for both lighting and ignition. The apparatus represents a great advance over all previous types. Electrically and mechanically perfect, it comprises a generator, automatic switch and governor—the whole operating at **engine speed.**

RUNS AT THE SPEED OF YOUR ENGINE:

The Dyneto System provides a compact, slow-speed, direct-current generator of suitable capacity, an automatic switch for connecting and disconnecting it to a storage battery, and a current regulator to automatically control and adapt the current output of the generator to the actual requirements of the battery regardless of **any variations of engine speed** to be encountered in practical service.

This apparatus will keep in full charge and perfect working order a three-cell, six-volt storage battery, supplying current for starting the engine and for lighting as many lamps as may be needed after the engine is stopped.

Every element of waste or misuse of current has been eliminated—the Dyneto Governor causes just enough current to be generated to meet requirements and no more. Lights, electric fans, horns, etc., may be operated from the same system more efficiently and economically than by any other. The Governor increases or decreases the current amount generated according to your needs.

Let us tell you more. Our Booklets containing complete technical data and information as to operation and cost will interest you. Write for details.

DYNETO ELECTRIC CO.

Sales Dept., SYRACUSE, N. Y. **Factory, ELBRIDGE, N. Y.**

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TALC

TIRE TALC

AMERICAN Lava Co., Chattanooga, Tenn.
(See pages 109 and 110.)

AMERICAN Talc Co., 22-24 Custom House St., Boston, Mass. "Imperial."
(See page 85.)

BINNEY & Smith Co., 81 Fulton St., New York, N. Y. "Tyreze."

DOGGETT, Stanley, 101 Beekman St., New York, N. Y.

IMPERIAL—See American Talc Co.

NEVINS Co., Samuel, 109 E. Second St., Philadelphia, Pa.

NORTH Carolina Talc & Mining Co., Hewitts, N. C.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

TYREZE—See Binney & Smith Co.

UNITED States Mica Co., 234 S. La Salle St., Chicago, Ill.
(See page 655.)

WHITTAKER, W. H., 245 Front St., New York, N. Y.

WILLIAMS & Co., C. K., Easton, Pa.

TANKS

ACETYLENE TANKS

ACETYLENE Specialty Co., 405 Broome St., New York, N. Y. "Stero-Light."

CARBO-LIGHT Co., Anderson, Ind.
(See page 359.)

COMPRESSED Gas Tank Co., Canton, Mass. "Victor."

FIRE-BALL Gas Tank & Illuminating Co., 5010 Delmar Blvd., St. Louis, Mo.
(See page 769.)

METEOR Auto Tank Co., 1666 Broadway, New York, N. Y.

PREST-O-LITE Co., 1400 E. South St., Indianapolis, Ind.
(See pages 157 and 417.)

SEARCHLIGHT Gas Co., 1125 Michigan Ave., Chicago, Ill.
(See page 753.)

STERO-LIGHT—See Acetylene Specialty Co.

VICTOR—See Compressed Gas Tank Co.

EMERGENCY OR RESERVE TANKS

(For carrying a reserve supply of gasolene or oil)

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.
(See page 197.)

FUEL AND WATER TANKS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 343.)

AEPINUS-HAGGSTROM Mfg. Co., 1502 Michigan Ave., Chicago, Ill.

AMERICAN Steel Package Co., Defiance, O.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Radiator Repairing Co., 1317 Vine St., Philadelphia, Pa.

AUTO Sheet Metal Works, 2228 Michigan Ave., Chicago, Ill.

AUTOMOBILE Supply Co., 547 W. 59th St., New York, N. Y.
(See page 673.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

BURLING, W. G., 1924 Commerce St., Philadelphia, Pa.

BUSH Mfg. Co., Hartford, Conn.
(See page 697.)

BUSHNELL Tank Works, Bushnell, Ill.

COLUMBUS Auto Brass Co., Columbus, O.
(See page 255.)

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Radiator Co., Detroit, Mich.

FEDDERS Mfg. Works, 55 Tonawanda St., Buffalo, N. Y.
(See page 181.)

FOLSOM Mfg. Co., C. G., 547 Scott St., South Bend, Ind.
(See page 745.)

FREELAND Sons Co., B. F., Sturgis, Mich.

HAYES Mfg. Co., 360-70 Maybury Ave., Detroit, Mich.
(See pages 94 and 95.)

HELLER-ALLER Co., Napoleon, O.

HELSER Sheet Metal Specialty Co., 123 N. Main St., Elkhart, Ind.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

IRONCLAD Mfg. Co., 204 Varet St., Brooklyn, N. Y.

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 657.)

KEIM Mills, John R., Liberty St. & Kensington Ave., Buffalo, N. Y.

KELLS Mfg. Co., W. J., 726-28 11th Ave., New York, N. Y.
(See page 383.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.
(See page 221.)

KINSEY Mfg. Co., Toledo, O.
(See page 383.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 657.)

LAWSON Co., F. H., C. H. & D. Ry. & Wheatly St., Cincinnati, O.

MANUFACTURERS Can Co., 434 Mulberry St., Newark, N. J.

MOLINE Stamping Co. (E. Moline), Moline, Ill.

NORTMANN-DUFFKE Foundry Co., 27th Ave. and N. W. R. R., Milwaukee, Wis.
(See page 419.)

NOVELTY Mfg. Co., Jackson, Mich.
(See page 231.)

OFF & Co., Christian, 5 N. New Jersey St., Indianapolis, Ind.

OHIO Blower Co., 330 Prospect Ave., N. W., Cleveland, O.

PRESSED Steel Tank Co., West Allis, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

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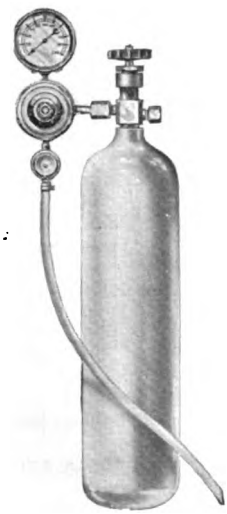
Reduced Prices
Liquid Gas Tire Fillers



In order to stimulate the largest possible sale of our line of Liquid Gas Tire Fillers during the coming season, we have made a horizontal reduction in prices that places our superior product considerably below any other automatic tire filler price on the market.

Carbon gas is a preservative of rubber because it contains no free oxygen. Automatic filling of tires from the expansion of liquefied gas frees motoring from its last and worst drudgery.

Improved Baby, $17.50

FIXED RETAIL PRICES TO CONSUMERS

(Liberal Discounts to Dealers)

Baby Tire Filler—Holds 4 lbs. of gas, enough for from 20 to 60 inflations, with 3 feet of hose and couplings, **$10.00.**

Improved Baby—Same tank, with 4 lbs. of gas, and with regulator and gauge for controlling pressures, including hose and couplings, **$17.50.**

Refilling either of the above, by exchange at dealers, ***$1.50.***

A pair of clamps and 12 ft. of hose with couplings to use in attaching device to running board, **$3.50.**

The Emancipator—A big 20 lb. drum of gas, standing upright on castors, with 10 ft. of high pressure hose, couplings, wrenches, regulator and gauge, complete, **$20.00.**

(Drum is only loaned you. Refilling by exchange, **$3.50.**)

Send for circulars and discounts.

The LIQUID CARBONIC COMPANY

432 WELLS ST. CHICAGO.

Apparatus supplied from any of our 11 Branch Houses. Refilling at the nearest of 13 liquid gas factories.

Play Safe On Gas Tanks!

Most of the dealers who handled imitations of Prest-O-Lite in years gone by "held the sack."

The imitators went out of business, leaving the dealer and his customers with tanks that could neither be re-charged nor sold.

Prest - O - Lite

Is the tank that your customer wants.

It's the **safe** tank to handle.

It can be exchanged, when empty, **everywhere and always.**

Prest - O - Lite has always been a **money maker** for dealers.

Imitations have always been **money losers** for dealers.

Think it over!

The Prest-O-Lite Co.

1400 East South St.

INDIANAPOLIS, IND.

Branches at Baltimore, Boston, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburg, Providence, San Francisco and Seattle.

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TANKS (Continued)

FUEL AND WATER TANKS (Continued)

STERLING Mfg. Co., 611-19 W. 55th St., New York, N. Y.

TRAGESER Steam Copper Works, John, 447-57 W. 26th St., New York, N. Y.

VAN Camp Hardware & Iron Co., Indianapolis, Ind.

WESTERN Drop Forge Co., Marion, Ind.
(See page 489.)

WILLIS & Sons Co., 204-06 18th St., Moline, Ill.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

XARGIL Mfg. Co., 34 Broadway, Utica, N. Y.
(See page 297.)

GASOLINE STORAGE TANKS AND SYSTEMS

ACME—See Wilson & Bennett Mfg. Co.

AIR-TIGHT Steel Tank Co., Oliver Bldg., Pittsburg, Pa.

AMERICAN Oil Pump & Tank Co., Dayton, O.

AMERICAN Steel Package Co., Defiance, O.

ARCHER Tank Co., 76 West St., Rutland, Vt.

B. M. C.—See Butler Mfg. Co.

BEMAN Automatic Oil Can Co., Meadville, Pa.

BOWSER & Co., S. F., Ft. Wayne, Ind.
(See page 781.)

BROWN Stamping Co., Dawson St., Toledo, O.

BUTLER Mfg. Co., Kansas City, Mo. "B. M. C."

CHAMPION—See Cleveland Faucet Co.

CHAMPION—See Optenburg Iron Works.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O. "Champion."

CLEVELAND Wire Spring Co., Cleveland, O.

COLUMBIAN Steel Tank Co., 1605 W. 12th St., Kansas City, Mo.

DAYTON Iron Works Co., Ice Ave., Dayton, O.

DELPHOS Mfg. Co., Pierce St., Delphos, O.

EASTERN Oil Tank Co., 136 Fletcher St., Lowell, Mass.

FREELAND Sons Co., B. F., Sturgis, Mich. "Pioneer."

GEYSER Oil Tank Co., Fort Wayne, Ind.

GILBERT & Barker Mfg. Co., 80 Fourth Ave., New York, N. Y.
(See page 657.)

HAINES Oil Measuring Pump Co., 20 N. 15th St., Harrisburg, Pa.

HYDRAULIC Oil Storage Co., Penobscot Bldg., Detroit, Mich. "Snells."
(See page 665.)

IDEAL—See Kupferle Bros. Mfg. Co.

IDEAL—See Janney, Steinmetz & Co.

IRONCLAD Mfg. Co., 204 Varet St., Brooklyn, N. Y.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Ideal."
(See page 657.)

KALTENBACH, Fred, 919 Washington Blvd., Chicago, Ill.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 657.)

KUPFERLE Bros. Mfg. Co., 600-04 N. Second St., St. Louis, Mo. "Ideal."

MILWAUKEE Oil Pump & Tank Co., Majestic Bldg., Milwaukee, Wis.

NATIONAL Oil Pump & Tank Co., 411-13 E First St., Dayton, O.

NATIONAL Scales Corp., Lancaster, Pa.

NEIL & Co., Wm., 617 Division St., Chicago, Ill.
(See page 657.)

NEW York Oil Cabinet Co., 221 Front St., New York, N. Y. "Wiley."

NORWICH Storage Tank Co., Lackawanna Ave., Norwich, N. Y.

OPTENBURG Iron Works, Sheboygan, Wis "Champion."

PIONEER—See Freeland Sons Co.

RUDMAN, C., 59 Fulton St., New York, N. Y.

SCAIFE & Sons Co., Wm. B., Pittsburg, Pa.
(See page 419.)

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass.

SNELLS—See Hydraulic Oil Storage Co.

SPRINGFIELD—See Gilbert & Barker Mfg Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TIRRILL Gas Machine Lighting Co., 509 Fifth Ave., New York, N. Y.

TOKHEIM Mfg. Co., 815 N. First St., W., Cedar Rapids, Ia.

U. S. Pump & Tank Co., 4141 Olive St., St. Louis, Mo.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WAYNE Oil Tank & Pump Co., Fort Wayne, Ind.
(See page 419.)

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

WESTERN Oil Pump & Tank Co., 2437 Kosciusko St., St. Louis, Mo.

WILEY—See New York Oil Cabinet Co.

WILSON & Bennett Mfg. Co., 3136 S. Canal St., Chicago, Ill. "Acme."

WILSON & Co., F. Cortez., 239-41 Lake St., Chicago, Ill.

TIRE INFLATING TANKS

AUTO Tire Inflating Co., 104 S. Eighth St., Brooklyn, N. Y. "Wyman."

BISHOP-BABCOCK-BECKER Co., 525 Garfield Bldg., Cleveland, O.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

EMANCIPATOR—See Liquid Carbonic Co.

FEDERAL Brass Works, W. Illinois & Franklin Sts., Chicago, Ill.

LENNOX Chemical Co., 1201 E. 55th St., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 32.

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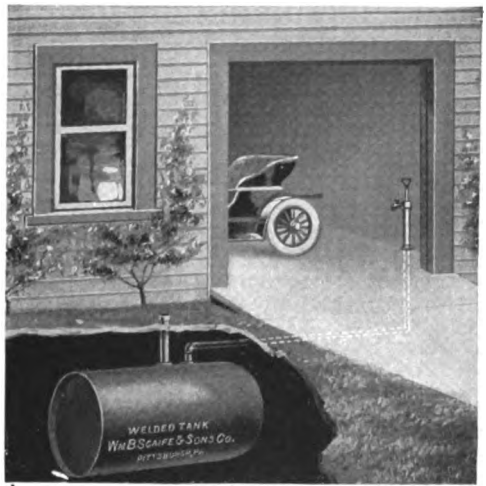
Perforated Metals
of
Every Description

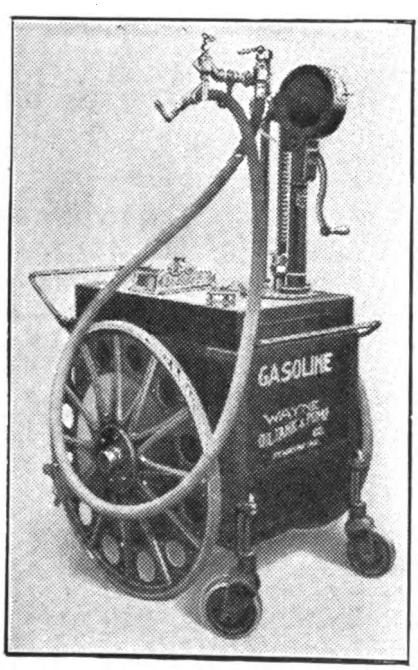
Crucible Steel Castings

Pressed Steel Tanks
and
Deep Stampings

NORTMANN-DUFFKE FOUNDRY CO.
27th Avenue & N. W. R. R.
MILWAUKEE, WIS.



COMPLETE
Gasoline Storage Outfits
FOR HOLDING GASOLINE
WELDED TANKS
ARE IDEAL
Send for Catalog G
Wm. B. Scaife & Sons Co.
Founded 1802
PITTSBURGH, PA.



"Wayne" Portable for Gasoline

No outfit is quite so complete as the WAYNE PORTABLE for safety and ease in handling gasoline around the garage. It reduces to a minimum the fire hazard on portable storage of gasoline.

Note the strong steel frame construction which supports the tank. The solid steel wheels are attached to this frame, which prevents the necessity of an opening through the tank for axle equipment.

The tank is made of 3/16-inch boiler plate, welded into one solid shell without a seam; has only three openings, which are in the top for pump, fill pipe, and magnetic gauge for indicating the quantity of liquid in the tank.

The filling process is performed without exposing the gasoline to the air, which is another protection against fire and loss by waste and evaporation.

The pump is Model H, one-gallon special for portable use, has 10 gallon counting register, spring lock and hose connection; autographic sales register is furnished when wanted.

Pump measures pints, quarts, half gallons and gallons accurately and locks automatically when tank is empty.

This outfit is complete in every detail.

WRITE FOR CATALOG-P.

WAYNE OIL TANK & PUMP CO.
FORT WAYNE, IND.

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TANKS (Continued)

TIRE INFLATING TANKS (Continued.)

LIQUID Carbonic Co., 432 Wells St., Chicago, Ill. "Emancipator."
(See page 417.)

NEW York Coach & Auto Lamp Co., 794-98 Tenth Ave., New York, N. Y. "Universal."

PREST-O-LITE Co., 1400 E. South St., Indianapolis, Ind.
(See pages 157 and 417.)

UNIVERSAL—See New York Coach & Auto Lamp Co.

WYMAN—See Auto Tire Inflating Co.

TIRE TESTING TANKS

EDWARDS, J. H., 59 Park Pl., New York, N. Y.

TAPE

INSULATING TAPE

AMERICAN Electrical Works, Providence, R. I.

BLACK DIAMOND—See Dunton Co.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

CLIFTON Mfg. Co., Jamaica Plain, Boston, Mass.

DUNTON Co., M. W., 65 Atlantic Ave., Providence, R. I. "Black Diamond."
(See page 485.)

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "J-M."

KERITE Insulated Wire & Cable Co., 30 Church St., New York, N. Y.

MATTSON Rubber Co., Lodi, N. J.
(See page 431.)

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

WALPOLE Rubber Co., Walpole, Mass.

TAXIMETERS

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

AMERICAN Taximeter Co., 736-39 Seventh Ave., New York, N. Y.

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importer.)

EVER READY—See American Ever Ready Co.

INTERNATIONAL Taxameter Co. of America, 1974 Broadway, New York, N. Y.

NAUGHTON-MULGREW Taximeter Cab Co., 153-57 E. 53d St., New York, N. Y. (Importers.) "Richert."

RICHERT—See Naughton-Mulgrew Taximeter Cab Co.

TEES

PIPE TEES

(See Fittings, Pipe)

TELEGRAPH

SHIP TELEGRAPH

RUSH Marine Signal Co., 537 Hudson St., New York, N. Y.,

TERMINALS

WIRE TERMINALS

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Ever Ready."

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BASCO—See Briggs & Stratton Co.

BECCO—See Beck Co.

BECK Co., Rockville Centre, N. Y. "Becco."
(See page 163.)

BLISS-CHESTER Co., Providence, R. I. "Duplex."
(See page 421.)

BOLTON, Geo. W., 733 Woodward Ave., Detroit, Mich. "Simplex," "Snap-On."

BRIGGS & Stratton Co., Milwaukee, Wis. "Basco."
(See page 423.)

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn.
(See page 369.)

DUPLEX—See Bliss-Chester Co.

EUREKA—See Morse, Frank W.

EVER READY—See American Ever Ready Co.

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

GOODSON Electric & Mfg. Co., Providence, R. I.

HERZ & Co., Puck Bldg., New York, N. Y.
(See page 335.)

LEMKE Electric Co., 280-82 Lake St., Milwaukee, Wis.

LOMBARDI Motor Co., Derby, Conn.

MAC-KAE Mfg. Co., 105 Amory St (Jamaica Plain) Boston, Mass.
(See page 631.)

MONROE Electric Mfg. Co., Box 57, Monroe, Mich.
(See page 631.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. "Eureka."
(See page 259.)

MOSLER & Co., A. R., 163 W. 29th St., New York, N. Y.
(See page 323.)

NEVER-MISS Mfg. Co., Lansing, Mich.
(See page 421.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PHILLIPS-POTVIN Mfg. Co., Minneapolis, Minn.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 277.)

Complete Index to Classification appears on Pages 8 to 22.

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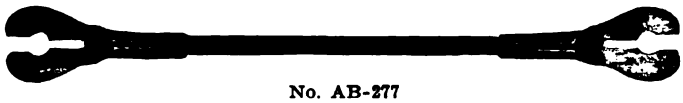
"MONROE" BATTERY CONNECTORS



No. AB-277

It's a simple affair and serves its purpose well.
The construction of the brass terminals makes it unnecessary to remove the binding nut on the battery for attaching or removal.
The connecting wire is of flexible cord and will stand any amount of twisting and bending.
Write us for samples and prices on your requirements.

The W. G. Nagel Electric Company, Toledo, Ohio

Don't Overlook the Best Selling

SPARK PLUGS

Never-Miss No. 8 have made good for seven years. Why?
ONE DOLLAR FOR ANY SIZE, FOR ANY CAR
and Guaranteed for one year's wear
WE MANUFACTURE:
SPARK-PLUGS, PORCELAIN and MICA; AMMETERS; VOLT and COMBINATION INSTRUMENTS; TERMINALS, BATTERY CONNECTIONS, CHAIN TOOLS, Etc., Etc.
Every Live Jobber from Maine to California can supply you. Our New 1911 Catalogue now ready. Get it.

NEVER-MISS MFG. CO., Inc., Lansing, Mich.

"RAJAH"

SPARK PLUGS

IGNITION ABSOLUTELY SURE

RAJAH AUTO SUPPLY COMPANY BLOOMFIELD, NEW JERSEY
Watsessing Station, D. L. & W. R. R.

JOHN MILLEN & SON, Ltd. - MONTREAL, TORONTO, VANCOUVER

DUPLEX WIRE TERMINALS

DUPLEX FLEXIBLE CONNECTOR
FOR BATTERY CELLS
PREVENTS LOOSE WIRES AND SHORT CIRCUITS
SEND 50 CENTS FOR ASSORTED PACKAGE OF TERMINALS OR CONNECTORS
SHEET METAL BRASS CAPS

THE BLISS-CHESTER CO.
PROVIDENCE, R. I.

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TERMINALS (Continued)

WIRE TERMINALS (Continued.)

RAJAH Auto Supply Co., Watsessing Station, Bloomfield, N. J.
(See page 421.)

SHAIN, Chas. D., 1926 Broadway, New York, N. Y.
(See page 589.)

SIMPLEX—See Bolton, Geo. W.

SNAP-ON—See Bolton, Geo. W.

STANDARD Battery Connection Co., 27 Copeland St., Roxbury, Mass.

STERLING Machine & Stamping Co., Wellington, O.

TREGONING Electric Mfg. Co., 418 W. Prospect Ave., Cleveland, O.

TESTERS

ACID TESTERS

(See Hydrometers)

BATTERY TESTERS

(See Gauges, Battery)

GASOLINE TESTERS

(See Hydrometers)

THIMBLES

WIRE ROPE THIMBLES AND SLEEVES

AMERICAN Steel & Wire Co., Chicago, Ill.
(See page 725.)

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

THREAD

TOP AND UPHOLSTERY THREAD

AMERICAN Thread Co., 260 W. Broadway, New York, N. Y.

CRANSKA Thread Co., Worcester, Mass.

MEYER & Co., John C., Lowell, Mass.

SUMMIT Thread Co., East Hampton, Conn.

TILE

RUBBER TILE

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HOME Rubber Co., Trenton, N. J.

MECHANICAL Rubber Co., Chicago, Ill.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.

TIMERS

IGNITION OR SPARK TIMERS

ALMY Water Tube Boiler Co., foot of Rhoades St., Providence, R. I.

AMERICAN Coil Co., Cocasset & Wall Sts., Foxboro, Mass.

AMERICAN Electric Co., State & 58th Sts., Chicago, Ill. "Samson."

AMERICAN Garage & Timer Co., Suffolk, Va. "Edgerton."

APPLE—See Dayton Electrical Mfg. Co.

ATWATER Kent Mfg. Works, 44 N. Sixth St., Philadelphia, Pa.
(See page 747.)

AUBURN Ignition Mfg. Co., Auburn, N. Y.
(See page 777.)

AUTO & Power Appliance Co., The Arcade, Cleveland, O.

B. & S.—See Briggs & Stratton Co.

BACKE Commutator Co., 33 Herkimer Pl., Brooklyn, N. Y.
(See page 423.)

BAY State Screw Co., Hatfield, Mass.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."
(See page 159.)

BEMUS—See Waterhouse Co.

BENFORD Mfg. Co., E. M., Mt. Vernon, N. Y. "Monarch."
(See page 677.)

BRIGGS & Stratton Co., Milwaukee, Wis. "B. & S."
(See page 423.)

CONNECTICUT Telephone & Electric Co., 34 Britannia St., Meriden, Conn.
(See page 369.)

CROUSE-HINDS Co., 308 W. Jefferson St., Syracuse, N. Y.

DAYTON Electrical Mfg. Co., 89 S. St. Clair St., Dayton, O. "Apple."

DAYTON Engineering Laboratories Co., Dayton, O.
(See page 747.)

DUPLEX Electric Co., 13 McWilliams St., Fond-du-Lac., Wis.
(See page 771.)

EDGERTON—See American Garage & Timer Co.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."
(See page 741.)

FANT, Paul B., Pittsburg, Pa.

FISH Systems Co., Majestic Bldg., Indianapolis, Ind.

FULMER, C. F., 415 Sycamore St., Plainfield, N. J. "Invincible."

HARDER'S Fire-proof Storage & Van Co., 40th St. & Calumet Ave., Chicago, Ill. "Phillips."

HEINZE Electric Co., Lowell, Mass.

HERBERT, W. H., 3312 Wabash Ave., Chicago, Ill. "Little Giant."

Complete Index to Classification appears on Pages 8 to 22.

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The B. & S. IGNITER

For Three, Four and Six Cylinder

and

The STAR IGNITER

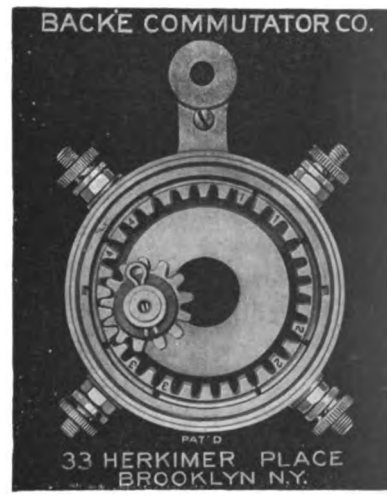
For One and Two Cylinder Motors

A most compact assembly and an absolutely uniform spark under all conditions with a minimum current consumption. Nothing on the dash but a simple switch with a button for starting on the spark.

BRIGGS & STRATTON CO.

MILWAUKEE, WIS.

Runs in either direction. Does not arc.



The Backé Commutator

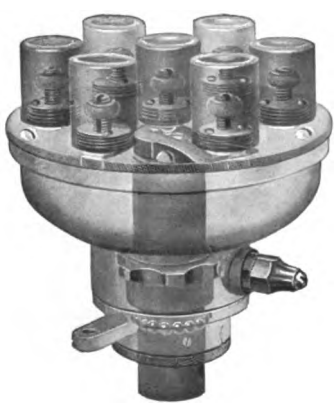
Looks Well, Is Made Well,
Wears Well and Sells Well.

LIST PRICE, $10.00

Liberal Discount to Legitimate Dealers.

UNCAS
IMPROVED DISTRIBUTOR

Ball Contact Ball Bearing



Why use a four unit coil, when with the Leavitt Improved Distributor a first-class coil with irridium points will do the work? You have but one adjustment to attend to and less wires; consequently less trouble, as the distributor will work on from ¼ to ½ ampere and will not work on more than one ampere, whereas on the timer the vibrator can be adjusted to take from 1 ½ to 2 amperes. With results; excessive burning at contact points. We have been making distributors for four years and they have made good. In putting our 1910 distributor on the market we have every confidence that it will meet, if possible, with greater success than our previous model, having improved it where experience has taught us would be advantageous. For double ignition the distributor fulfills every requirement. We can point to one of the leading manufacturers who has been using our distributors for this purpose for the past four years with absolutely no trouble. We will be pleased to furnish manufacturers sample for test upon request and are prepared to furnish for any number of cylinders from two to eight.

We guarantee all our goods and back up the guarantee
Send for catalog and prices

STERLING MACHINE CO.

SUCCESSORS TO

THE UNCAS SPECIALTY CO.

NORWICH, - - - - - - CONN.

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TIMERS (Continued)

IGNITION OR SPARK TIMERS (Continued)

HERZ & Co., Puck Bldg., New York, N. Y.
(See page 335.)

HIGH Frequency Ignition Coil Co., 126½ E. Main St., Los Angeles, Cal. "Seeley."

INVINCIBLE—See Fulmer, C. F.

KINGSTON—See Kokomo Electric Co.

KLAHN—See Mosler & Co.

KOKOMO Electric Co., 1040 Webster St., Kokomo, Ind. "Kingston."

LEHMAN Mfg. Co., J. H., 500 Fifth Ave., New York, N. Y.

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.
(See page 503.)

LITTLE GIANT—See Herbert, W. H.

LONG Bros., Kokomo, Ind.

LUNDGREN Mfg. Co., 308 Hale Bldg., Philadelphia, Pa.

MAC-KAE Mfg. Co., 185 Amory St., (Jamaica Plain) Boston, Mass.
(See page 631.)

MAXIMUS—See Beckley-Ralston Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONARCH—See Benford Mfg. Co.

MOORE—See Palmer-Moore Co.

MOSLER & Co., A. R., 163 West 29th St., New York, N. Y. "Klahn." "Umph."
(See page 323.)

NEW York Coil Co., 338-40 Pearl St., New York, N. Y. "Rhoades."

NEWCOMB, A. H., 1944 W. 21st St., Chicago, Ill. "Star."

PALMER-MOORE Co., 230 Tallman St., Syracuse, N. Y. "Moore."

PERFEX—See Electric Goods Mfg. Co.

PHILADELPHIA Novelty Supply Co., 2031-33 N. 29th St., Philadelphia, Pa.

PHILADELPHIA Timer & Machine Co., 51st St. & Lancaster Ave., Philadelphia, Pa. "Velos."
(See page 413.)

PHILLIPS-POTVIN Mfg. Co., Minneapolis, Minn.

PHILLIPS—See Harder's Fire-proof Storage & Van Co.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 277.)

RHOADES—See New York Coil Co.

ROCHESTER Timer Co., 203 State St., Rochester, N. Y. "Roch-O."

ROCH-O—See Rochester Timer Co.

SAMSON—See American Electric Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SCHUYLER—See Wray Pump & Register Co.

SEELEY—See High Frequency Ignition Coil Co.

SINTZ—See Wilmarth & Morman Co.

STAR—See Newcomb, A. H.

STERLING Machine Co., Norwich, Conn. "Uncas."
(See page 423.)

TRIO Mfg. Co., 1206 Bellevue Ave., Detroit, Mich.

UMPH—See Mosler & Co.

UNCAS—See Sterling Machine Co.

VELOS—See Philadelphia Timer & Machine Co.

WATERHOUSE Co., 6 Pelham St., Boston, Mass. "Bemus."

WICO—See Witherbee Igniter Co.

WILMARTH & Morman Co., 589 Canal St., Grand Rapids, Mich. "Sintz."

WITHERBEE Igniter Co., Springfield, Mass. "Wico."
(See page 163.)

ZIMMERMAN-SMITH Co., 72-74 Main St., N. Tonawanda, N. Y.

TIPS

BURNER TIPS

(See Burners, Acetylene)

TIRES

AEROPLANE TIRES

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

DIAMOND Rubber Co., Akron, O.
(See page 139.)

GOODRICH Co., B. F., Akron, O. "Palmer."

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

PALMER—See Goodrich Co.

PENNSYLVANIA Rubber Co., Jeanette, Pa.
(See page 663.)

FLANGED STEEL TIRES

(For adapting automobiles to run on railroad tracks)

GOODMAN Co., Bucyrus, O.

LEATHER TIRES

(For Leather Treads—See Treads, Detachable)

HORSESHOE—See Racine Auto Tire Co.

KING Leather Tire Co., 3417-19 Vleit St., Milwaukee, Wis.

RACINE Auto Tire Co., 14th & Clark Sts., Racine, Wis. "Horseshoe."

REGENT Tire Co., 3313-15 Troost Ave., Kansas City, Mo.

REX Tire Co., 138-40 W. 68th St., New York, N. Y.

MOTOR CYCLE TIRES

AJAX-GRIEB Rubber Co., Trenton, N. J.
(See page 285.)

BATAVIA Rubber Co., Batavia, N. Y.

CONTINENTAL Rubber Works, 19th & Liberty Sts., Erie, Pa.

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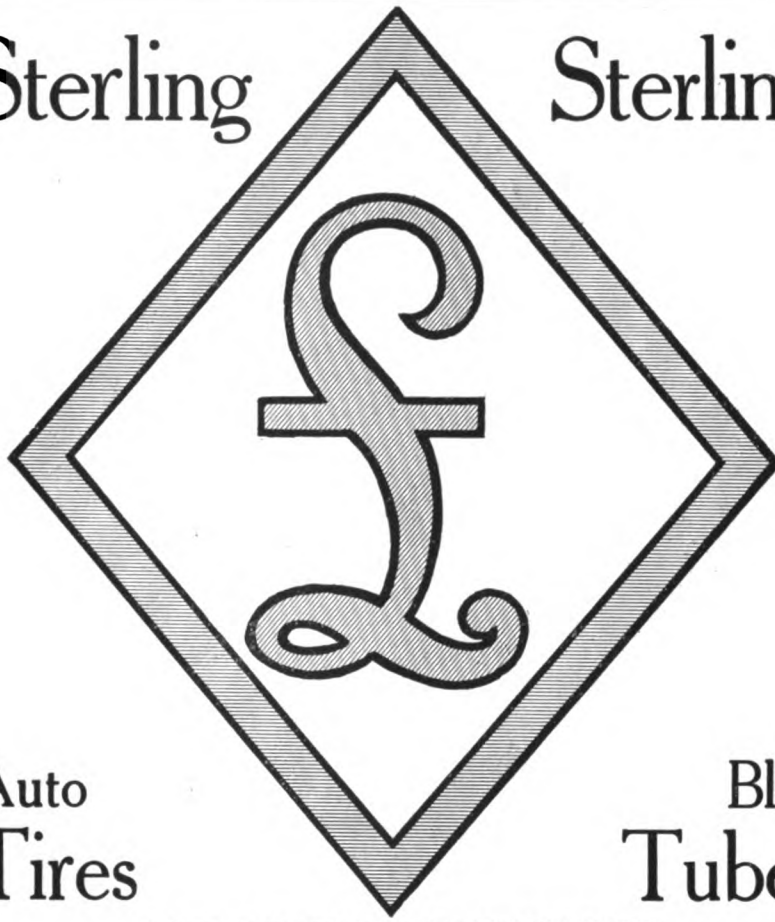
Sterling Sterling



Auto Tires

Blue Tubes

DISTRIBUTORS—PNEUMATICS

DISTRICT OF COLUMBIA, WASHINGTON.—The C. J. McCubbin Co., 423 Tenth St., N. W.
FLORIDA, JACKSONVILLE.—McGraw Brothers Company.
ILLINOIS, CHICAGO.—Chicago Iron Store, Fulton & Halsted Sts.
ILLINOIS. PEORIA.—M. M. Baker Company, Harrison & Water Sts.
ILLINOIS, STREATOR.—Stauber Bros. Co.
INDIANA, FOWLER.—Mavity-Sleeper Co., Fifth St. & Madison Ave.
INDIANA, INDIANAPOLIS.—W. J Holliday & Co.
KENTUCKY, LOUISVILLE.—Fulton Conway & Co.
LOUISIANA, NEW ORLEANS.—F. H. Bayley, 407 Hennen Bldg.
MAINE, PORTLAND.—James Bailey Co., 18 Free St
MARYLAND, BALTIMORE—E. Scott Payne Co., 362 Gay St.
MASSACHUSETTS, BOSTON.—Coward Auto Supply Co., 222 Eliot St.
MASSACHUSETTS, BOSTON.—Butts & Ordway, 33 Purchase St.
MICHIGAN, DETROIT.—Standart Bros. Ltd., Jefferson Ave
MINNESOTA, ST. PAUL.—C. J. Smith & Co., 16 W 4th St.
MISSOURI, KANSAS CITY.—Mercantile Lumber & Supply Co., 906 Baltimore Ave.
MISSOURI, ST. LOUIS.—Campbell Iron Company, 809 Cass Ave.
NEBRASKA, OMAHA.—Paxton & Gallagher Co., Tenth St. Viaduct.
NEW JERSEY, PATERSON.—H. W. Mills & Co., 59 Washington St.
NEW YORK, BROOKLYN.—M. Langler & Sons, 91 Grand Ave.
NEW YORK, BUFFALO.—Beals & Company, 48 Terrace.
NEW YORK, NEW YORK.—Wilson Trading Co., 46 Cortlandt St.
NEW YORK, NEW YORK, EXPORT.—Rutherford Rubber Company, 45 Broadway.
NEW YORK, SCHENECTADY.—J. A. Rickard & Co., 253 State St.
NORTH CAROLINA, ROCKINGHAM.—The Everett Hardware Company.
OHIO, CINCINNATI.—National Hardware Co., 327 W 4th St.
OHIO, CLEVELAND.—Lockwood-Luetkemeyer-Henry Co., 419 Superior Ave.
PENNSYLVANIA, LANCASTER.—Herr & Co. 7 E. King St.
PENNSYLVANIA, PITTSBURG.—Bindley Hardware & Mfg. Co., 7th Ave. & Grand St.
PENNSYLVANIA, SCRANTON.—Charles B. Scott, 119 Franklin Ave
PENNSYLVANIA, WILKES-BARRE.—Phelps, Lewis & Bennett, 4 N. Main St.
RHODE ISLAND, PROVIDENCE.—Albert E. Goodby Co., 57 Washington St.
SOUTH CAROLINA, SUMTER.—Sumter Automobile Supply Co., Oakland Ave.
TENNESSEE, MEMPHIS.—W. C. Early Company.
TEXAS, AMARILLO.—Northwest Texas Tel. Supply Co. 111 E. 3rd St.
TEXAS, DALLAS.—Padgitt Brothers Company.
TEXAS, HOUSTON.—Bering-Cortes Hardware Co.
TEXAS, SAN ANTONIO.—Woodward Carriage Company.
TEXAS, WACO.—Tom Padgitt Company.
VIRGINIA, RICHMOND.—Virginia-Carolina Hardware Co.
WISCONSIN, LA CROSSE.—La Crosse Plow Company.

Manufactured by Sterling Rubber Works, Rutherford, N. J.

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TIRES (Continued)

MOTOR CYCLE TIRES (Continued)

DIAMOND Rubber Co., Akron, O. (See page 139.)

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

FISK Rubber Co., Chicopee Falls, Mass.

G. & J. Tire Co., Indianapolis, Ind.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O. (See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

KELLY-RACINE Rubber Co., Racine, Wis.

KOKOMO Rubber Co., Kokomo, Ind.

MORGAN & Wright, Detroit, Mich.

PNEUMATIC TIRES

(See also Tubes, Inner)

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

AJAX-GRIEB Rubber Co., Trenton, N. J. (See page 285.)

BATAVIA Rubber Co., Batavia, N. Y.

CARPRINGCO—See New Jersey Car Spring & Rubber Co.

CENTURY Rubber Trading Co., 123 W. 68th St., New York, N. Y. (See page 627.)

CONSOLIDATED Rubber Tire Co., 20 Vesey St., New York, N. Y. "Kelly-Springfield." (See page 667.)

CONTINENTAL Caoutchouc Co., 1788-90 Broadway, New York, N. Y.

CORD—See Goodyear Tire & Rubber Co.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers.) "Kempshall."

DIAMOND Rubber Co., Akron, O. (See page 139.)

DREADNAUGHT Tire Co., 170 Broadway, New York, N. Y.

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O. (See page 431.)

FISK Rubber Co., Chicopee Falls, Mass.

FRONTIER Rubber Co., 1400-10 Niagara St., Buffalo, N. Y.

G. & J. Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O. "Cord." (See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J. (See page 385.)

IMPERIAL—See McGraw Tire & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

JELCO—See Lee Co.

JENATZY Rubber Co., 36 W. 43d St., New York, N. Y. (Importers.)

KELLY-RACINE Rubber Co., Racine, Wis.

KELLY-SPRINGFIELD — See Consolidated Rubber Tire Co.

KEMPSHALL—See Cryder & Co.

KOKOMO Rubber Co., Kokomo, Ind.

LEE Co., J. Ellwood, Conshohocken, Pa. "Jelco."

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Rubber Co., Mansfield, O.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MOHAWK Tire Co., Utica, N. Y. (See page opposite page 794.)

MORGAN & Wright, Detroit, Mich.

NATIONAL Rubber Tire Mfg. Co., 762 Bullitt Bldg., Philadelphia, Pa.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J. "Carpringco."

NEWARK Rubber Mfg. Co., Commercial St., Newark, N. J.

PEERLESS Tire Co., 1610 Michigan Ave., Chicago, Ill.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PRINCE Tire Co., 1783 Broadway, New York, N. Y.

REPUBLIC Rubber Co., Youngstown, O.

SAFETY Tire Co., 1919 Broadway, New Conn. (See page 429.)

SEAMLESS Rubber Co., New Haven, Conn. (See page 567.)

SHAWMUT Tire Co., Boston, Mass. (See page 431.)

STAR Rubber Co., 405 Sweitzer Ave., Akron, O.

STEIN Double Cushion Tire Co., Akron, O.

STERLING Rubber Works, Rutherford, N. J. (See page 425.)

SWINEHART Tire & Rubber Co., Akron, O.

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

SOLID TIRES

CONSOLIDATED Rubber Tire Co., 20 Vesey St., New York, N. Y. (See page 667.)

CONTINENTAL Caoutchouc Co., 1788-90 Broadway, New York, N. Y. "Revere."

DIAMOND Rubber Co., Akron, O. (See page 139.)

FIRESTONE Tire & Rubber Co., Akron, O. (See page 431.)

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The Tires Used On 100,000 Cars

Over 500,000 Goodyear No-Rim-Cut tires have been sold already.

Last year our tire sales trebled---jumped to $8,500,000---because of this tire's popularity.

This year 64 leading motor car makers have contracted for these tires on their 1911 models.

Now that the price is equal, Goodyear No-Rim-Cut tires outsell our clincher tires almost six to one.

All because these patented tires get rid of rim-cutting entirely. And they are 10% oversize.

They save users all that rim-cutting costs. And they avoid overloading.

These two savings together, with the average car, cut tire bills in two. Yet these oversize tires---these No-Rim-Cut tires---cost no more than other standard tires.

Tire Book Free

Every motor car owner should send for our Tire Book. It is filled with valuable facts gleaned in 12 years of tire making. It tells you how to cut to the minimum this item of upkeep cost. Write for it.

GOODYEAR
No-Rim-Cut Tires
With or Without Non-Skid Tread

THE GOODYEAR TIRE & RUBBER COMPANY, Trade Street, Akron, Ohio

(278) ***Branches and Agencies in All the Principal Cities*** ***We Make All Sorts of Rubber Tires***

THE TRUCK MANUFACTURER

who wants his cars equipped with tires that will be easiest on his engine, and at the same time reflect credit on his judgment of tire values, will advise his customer to specify

GIBNEY
WIRELESS MOTOR TIRES

SEND FOR OUR CATALOG AND PRICES

JAMES L. GIBNEY & BRO.

PHILADELPHIA **NEW YORK**

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TIRES (Continued)

SOLID TIRES (Continued.)

GIBNEY & Bro., Jas. L., Philadelphia, Pa.
(See page 427.)

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O.
(See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

KOKOMO Rubber Co., Kokomo, Ind.

MILFORD Rubber Works, Milford, Ill.

MILLER Rubber Co., Akron, O. "Palmer."

MORGAN & Wright, Detroit, Mich.

MOTZ Tire & Rubber Co., Akron, O.
(See page 429.)

PALMER—See Miller Rubber Co.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLACK Tyre Co., 1741 Broadway, New York, N. Y.

REPUBLIC Rubber Co., Youngstown, O.

REVERE—See Continental Caoutchouc Co.

STERLING Rubber Works, Rutherford, N. J.
(See page 425.)

SWINEHART Tire & Rubber Co., Akron, O.

SPECIAL TIRES

AIRLESS Tire Co., 811 W. Washington St., Indianapolis, Ind. "National."

AMERICAN Wood Tire Co., Monadnock Blk., Chicago, Ill.

AUTO Emergency Tire Mfg. Co., 1223-25 Park Ave., Baltimore, Md.

BATAVIA Tire Co., 302 N. Craig St., Pittsburg, Pa.

BRIDGE Web Tire Co., 2962 Prairie Ave., Chicago, Ill.

CARHART Laminated Tire Co., Moore Bldg., San Antonio, Texas.

CLEVELAND Puncture Proof Tire Co., 1355 N. High St., Columbus, O.

CORWIN Tire & Mfg. Co., 1119 Masonic Temple, Chicago, Ill.

DAHL Punctureless Tire Co., Minneapolis, Minn.

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O.

ELDER Mfg. Co., 2305 N. Illinois St., Indianapolis, Ind.

FEAR-NAUGHT Tire & Rubber Co., 1779 Broadway, New York, N. Y.

FUDGE Bros. Mfg. Co., Marion, Ind.

HARRIS Tire & Rubber Co., Philadelphia, Pa.

LEE Co., J. Ellwood, Conshohocken, Pa. "Paynter."

McNAULL Auto Tire Co., Toledo, O.
(See page 627.)

MOTZ Tire & Rubber Co , Akron, O.
(See page 429.)

NATIONAL—See Airless Tire Co.

PAYNTER—See Lee Co.

ST. JOHNS Rubber Tire Co., 116 Broad St., New York, N. Y.

SECTIONAL Rubber Tire Co., Wallaston, Mass.

SLIP-OVER Tire Co., Marion, Ind.

STEEL Cushion Tire Co., Marbridge Bldg., New York, N. Y.
(See page 627.)

SWINEHART Tire & Rubber Co., Akron, O.

TRIANGLE Co., 318-20 E. 55th St., Chicago, Ill.

UNITED States Wheel Co., 250 W. 54th St., New York, N. Y.

TOOLS

CALKING TOOLS

ANDERSON Forge & Tool Co., 271 Guoin St., Detroit, Mich.

ATHA Tool Co., Chapel St., Newark, N. J.

KRAEUTER & Co., 571-79 18th Ave., Newark, N. J.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

RUNDLE-SPENCE Mfg. Co., 57 Second St., Milwaukee, Wis.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

CHAIN REPAIR TOOLS.

ADAPT Machine Co., 1610 Wabash Ave., Chicago, Ill.

BROWN Mfg. & Garage Co., J. C., Butler, Ind.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

MACDONALD, J. N., 312 Asylum St., Hartford, Conn.

NEVER-MISS Mfg. Co., Lansing, Mich.
(See page 421.)

MOTOR CYCLE CHAIN REPAIR TOOLS

ELITE Mfg. Co., Ashland, O.

FLASH—See Widmayer Co.

WIDMAYER Co., Frank B., 2312 Broadway, New York, N. Y. "Flash."

MOTOR CYCLE VALVE LIFTING TOOLS

SWENSON, B. A., 298 Blackstone St., Providence, R. I.

PISTON RING REMOVING TOOLS

ECONOMIC Tool Co., Lorain, O.

TIRE CHAIN REPAIR TOOLS

SHELLEY Tool Co., Saranac Lake, N. Y.

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The Tire With the Hidden Claws

"Pussy Foot Tread"

They Grip Only When Your Car Skids or the Brake Is On

SAFETY TIRES WILL NOT SKID

On Wet or Dry Pavements, Snow or Ice

A New Application of the Law of Resistance

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1919 BROADWAY **NEW YORK**

End Punctures, Blowouts, Tire-Troubles!

The World's Only Resilient Cushion Tire

By giving the Motz the resiliency of the pneumatic tire the lone objection to the trouble-proof solid tire has been removed. For the Motz tire is as easy riding as the pneumatic.

Until the perfection of the Motz, hard rubber tires abolished tire troubles. But hard rubber tires made riding rough—jolted and jarred the machine and its occupants.

The undercut sides and slantwise bridges *give*, as does the air in pneumatic tires. Note in the photographic illustration the tire's resiliency.

MOTZ CUSHION TIRES

As a result of these facts, within a few months' time the Motz has taken motordom by storm. It is the 1911 tire sensation. For electric cars alone, the Motz today is the fastest-selling tire.

The agency for the Motz will be a tremendously profitable business for you. Motz tires are built for electric cars, gasoline cars, commercial trucks, physicians' cars, taxicabs, etc. *Motz tires are quick-detachable.* Write us today.

DEALERS AND GARAGE MEN

Trade quotations will be mailed you by return mail if you'll write us at once—today. Our extensive advertising campaign is producing an astounding demand for this *perfect*, trouble-proof tire. The dealer can apply it.

Note the Tire's Resiliency

The Motz Tire and Rubber Co.

Dept. 67, Akron, Ohio

Branches:

Chicago, Detroit and Kansas City

(46)

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TOOLS (Continued)

TIRE TOOLS

(For taking off and putting on tires)

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. **"Ever Ready."**

ARCHIBALD, W. T., 1242 W. Lehigh Ave., Philadelphia, Pa. "Bull-dog."

BALZER Co., Gus., 1777 Broadway, New York, N. Y.

BECCO—See Beck Co.

BECK Co., Rockville Centre, N. Y. "Becco."
(See page 163.)

BLANCHARD, A. W., 10 Clinton St., Brooklyn, N. Y.

BULL-DOG—See Archibald, W. T.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

EVER READY—See American Ever Ready Co.

IDEAL Tool Mfg. Co., 2112 N. Sixth St., Philadelphia, Pa.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.
(See page 671.)

MORGAN, B., John St., Newport, R. I.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

NATIONAL Jack & Mfg. Co., 130-32 S. Clinton St., Chicago, Ill.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

P. C. W. Mfg. Co., 472 Fulton St., Brooklyn, N. Y.

RHODES Mfg. Co., S. Division St. & First Ave., Grand Rapids, Mich.

SHAWVER Co., Springfield, O. "Springfield."

SPRINGFIELD—See Shawver Co.

STANDARD Auto Specialty Co., 57 Boerum St., Brooklyn, N. Y.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

UNIVERSAL Auto-Tire Remover Co., 948 Market St., San Francisco, Cal.

VALVE GRINDING TOOLS

ASHCROFT Mfg. Co., 85-89 Liberty St., New York, N. Y.
(See page 559.)

BROWN Co., 1071 S. Clinton St., Syracuse, N. Y.

CLEVELAND Pneumatic Tool Co., 6410 Hawthorne Ave., Cleveland, O.

FLEXIBLE Valve Remover Co., Providence, R. I. "Russell."
(See page 759.)

LITTLE WONDER—See R. & S. Specialty Mfg. Co.

MISCH—See Motch & Merryweather Machinery Co.

MOTCH & Merryweather Machinery Co., 707 Lakeside Ave., N. W., Cleveland, O. "Misch."

PIONEER—See Valve Seating Tool Co.

R. & S. Specialty Mfg. Co., Los Angeles, Cal. "Little Wonder."

RUSSELL—See Flexible Valve Remover Co.

VALVE Seating Tool Co., Southport, Conn. "Pioneer."
(See page 723.)

VALVE LIFTING TOOLS

ATLAS Machine Co., 12 Beverly St., Providence, R. I.

E-Z—See North, S. C.

FLEXIBLE Valve Remover Co., Providence, R. I.
(See page 759.)

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis.
(See page 283.)

HERCULES—See Rothstein Mfg. Co.

HOADLEY, F. B., 479 Willow St., Waterbury, Conn.

LITTLE GIANT—See Morgan, B.

LITTLE GIANT—See Standard Valve Lifter Co.

MECHANICAL & Electrical Mfg. Co., A. R. 2227 Prairie Ave., Chicago, Ill. "Triumph."
(See page 249.)

MILWAUKEE Auto Specialty Co., 152 2d St., Milwaukee, Wis. "Radium."
(See page 615.)

MORGAN, B., John St., Newport, R. I. "Little Giant."

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo.
(See page 481.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

NORTH, S. C., Elmira, N. Y. "E-Z."

P. C. W. Mfg. Co., 472 Fulton St., Brooklyn, N. Y.

PETERSON Valve Lifter Co., American Bldg., South Bend, Ind.

POLSON, W. F., 27 Chenango St., Buffalo, N. Y.

RADIUM—See Milwaukee Auto Specialty Co.

ROTHSTEIN Mfg. Co., 1041-59 Park Ave., New York, N. Y. "Hercules."

STANDARD Valve Lifter Co., 1587 Broadway, New York, N. Y. "Little Giant."

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TRIUMPH—See Mechanical & Electrical Mfg. Co.

WEEBER Mfg. Works, C. F., Albany, N. Y.

VALVE RETHREADING TOOLS

HERCULES—See Reece Co.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

REECE Co., E. F., Wells & Devens Sts., Greenfield, Mass. "Utility," "Hercules."

SUPERIOR Tap Co., Charlestown, N. H.

UTILITY—See Reece Co.

VALVE SEATING OR FACING TOOLS

CRONE, F. G., 334 E. Genesee St., Buffalo, N. Y.

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

VALVE Seating Tool Co., Southport, Conn.
(See page 723.)

Complete Index to Classification appears on Pages 8 to 22.

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Shawmut Tires

Shawmut Tire Co.
BOSTON, MASS.

"Firestone"

Solid and Pneumatic Tires

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"America's Largest Exclusive Tire and Rim Makers"

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WE MAKE A SPECIALTY OF THE MANUFACTURE OF RUBBER SUPPLIES OF EVERY DESCRIPTION USED IN THE AUTOMOBILE INDUSTRY.

OUR QUOTATIONS WILL PROVE INTERESTING

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TOPS

AUTOMOBILE TOPS

AMERICAN Auto Top Mfg. Co., 244-50 W. 49th St., New York, N. Y.
(See page 659.)

AMERICAN Top Co., Jackson, Mich.

AMESBURY Top Co., Cedar St., Amesbury, Mass.

ANDERSON & Co., F. W., 729 N. Uber St., Philadelphia, Pa.

ATKINS & Townsend, Felton, Del.

ATLANTA Automobile Top & Trimming Co., 759 Whitehall St., Atlanta, Ga.

AUTO Cape Top Co., 2334 Michigan Ave., Chicago, Ill.

AUTO Top Co., 209 E. Columbia St., Fort Wayne, Ind.
(See page 437.)

AUTO Top & Body Co., 257-59 N. Broad St. Philadelphia, Pa.

AUTOMOBILE Buggy Top Co. of America, Noxen, Pa.

BADGER—See Wisconsin Auto Top Co.

BAILEY & Co., S. E., Lancaster, Pa.

BALL Buggy Top Co., York, Pa.

BALTIMORE Buggy Top Co., 700-02 Pennsylvania Ave., Baltimore, Md.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BAUER Bros. Mfg. Co., 937 W. 8th St., Cincinnati, O.

BIEHLS Auto Top Co., 31 S. Fifth St., Reading, Pa.

BLACK Hawk Auto Top Co., 405 W. Fifth St., Waterloo, Iowa.

BLASIER Mfg. Co., M. E., 331 Columbia St., Utica, N. Y.

BLISS Auto Top Co., C. P., 2306 Walnut St., Denver, Col.

BLUE Ribbon Auto & Carriage Co., 154 Cannon St., Bridgeport, Conn.

BOHNET & Co., John, Clark Bldg., Grand Ave. & Washtenaw St., Lansing, Mich.
(See page 641.)

BORUM Son & Co., J. W., 351-53 Church St., Norfolk, Va.

BOSCHE Bros., 920 Main St., Buffalo, N. Y.

BRADFORD Co., Tenth & Tatnall Sts., Wilmington, Del.

BRIDGEPORT Vehicle Co., Holland & Fairfield Aves., Bridgeport, Conn.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROAD Street Top Co., 142 N. Broad St., Philadelphia, Pa.

BROWN Auto Top Co., 1347 Noble St., Philadelphia, Pa.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BUFFALO Auto Body & Trimming Co., 108 Terrace, Buffalo, N. Y.

BUOB & Scheu, 410 Court St., Cincinnati, O.

CHANSLOR & Lyon Motor Supply Co., 501-07 Golden Gate Ave., San Francisco, Cal.

CHICAGO Auto Top Co., 1507 Michigan Ave., Chicago, Ill.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 Michigan Ave., Chicago, Ill.

CISLER & Serson, 3111 Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., 103-14 N. Front St., Camden, N. J.

COLLINS & Son, G. A., Main & Church St., Akron, O.

COLUMBIA Auto Top Co., 83 Dwight St., Springfield, Mass.

COLUMBIA Tire & Top Co., 31 Irvington St., Boston, Mass.

CREAM City Trimming Co., 67-71 Juneau Ave., Milwaukee, Wis.

CUTTER, J. Frank, 414 Main St., Cambridge, Mass.

DALLAS Buggy Top Co., 562 Main St., Dallas, Tex.

DENNISTON Co., E. E., 184 W. Mohawk St., Buffalo, N. Y.
(See page 437.)

DETROIT Motor Car Supply Co., 1280 Jefferson Ave., Detroit, Mich.
(See page 659.)

DUANE & Co., W. J., 230 W. 53th St., New York, N. Y.

ECKLAND Bros., 110½ Sixth St., S., Minneapolis, Minn.

ELMWOOD Auto-Top & Supply Co. Elmwood Pl., O.
(See page 433.)

EMPIRE Auto Top Co., 207 N. 22d St., Philadelphia, Pa.

EMPIRE Auto Top & Supply Co., 1219-21 Michigan Ave., Chicago, Ill.

EMPIRE Dash & Fender Mfg. Co., 247-49 W. 47th St., New York, N. Y.

EMPIRE Top & Windshield Co., 221 Pleasant St., Boston, Mass.

ENNIS, W. G., 15 Hayne St., Charleston, S. C.

EUREKA Co., Rock Falls, Ill.

FALLS City Buggy Top Co., 200 E. Main St., Louisville, Ky.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

FOLGER & Drummond, Amesbury, Mass.

FRANK, W. H., 22-24 Harrison St., New Rochelle, N. Y.

FRAZIER & Co., W. S., Aurora, Ill.

GABEL-HILL Co., 121-25 Alexander St., Rochester, N. Y.

GALDE Patent Top Co., 253 Broadway, New York, N. Y.

GATES-OSBORNE Mfg. Co., 10 S. Second Ave., Marshalltown, Ia.

HILL Manufacturing Co., 25-27 Fuller St., Buffalo, N. Y.

HOLBROOK Co., 509-15 W. 56th St., New York, N. Y.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HOLCOMB Co., New Haven, Conn.

HUME Carriage Co., 66-68 Stanhope St., Boston, Mass.

INDIANA Top & Vehicle Co., Lawrenceburg, Ind.

INDIANAPOLIS Auto Top & Rubber Co., 909-17 E. Washington St., Indianapolis, Ind.

INDIANAPOLIS Dash Co., 2116 S. Meridian St., Indianapolis, Ind.

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TOPS AND SHIELDS

No room here to tell the story.
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ELEGANT IN STYLE AND APPEARANCE

They add to the dignity and beauty of the car. Made to fit any car. Elmwood Auto Tops are made from the best materials only, and by skilled workmen. Write us to-day giving description of car and we will send you samples and quotations.

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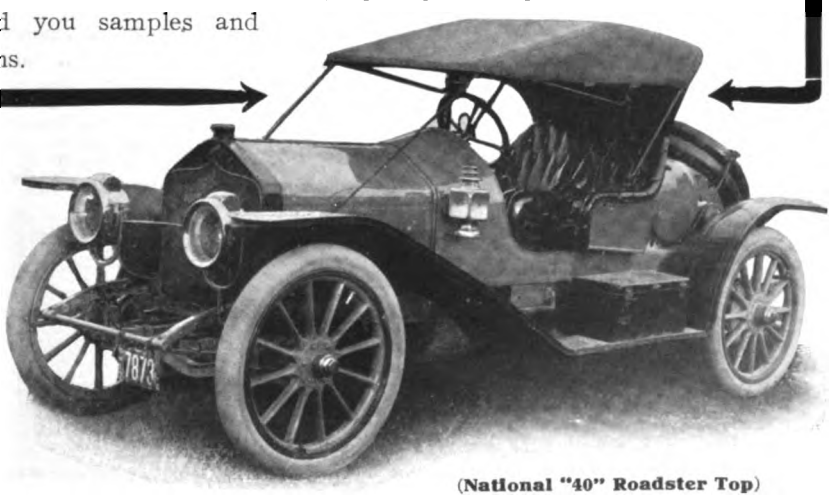

(National "40" Roadster Top)

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TOPS (Continued)

AUTOMOBILE TOPS (Continued)

IROQUOIS Auto Top Co., Utica, N. Y.

IRVIN Mfg. Co., R. J., 233 W. McCarty St., Indianapolis, Ind.
(See page 89.)

JOHNSON Service Co., Milwaukee, Wis.

KANSAS City Vehicle Co., 190 Main St., Kansas City, Mo.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KING Top Mfg. Co., Dayton, O.
(See page 435.)

KNIGHT-JONES Equipment Co., 2431 Michigan Ave., Chicago, Ill.

KREIDLER Auto Top Co., 213 S. Warren St., Trenton, N. J.

KROH Mfg. Co., C. Z., 1212-14 Jackson Ave., Toledo, O.

LA DUE Auto Top Co., 1109 Monroe St., Toledo, O.
(See page 437.)

LANE, T. W., Amesbury, Mass.

LONDON Auto Supply Co., 2540-42 Wabash Ave., Chicago, Ill.

LONGDIN & Brugger Co., Fond-du-Lac, Wis.

LOUD, Fred A., Franklin & Lansdowne Sts., Cambridge, Mass.

McCLELLAN, Chas. P., Fall River, Mass.

McNEAR, George W., 26-30 Cambria St., Boston, Mass.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MARSHALLTOWN Buggy Co., Church St., Third Ave., Marshalltown, Ia.

MASON, John A., 312 Washington St., Newton, Mass.

MATT & Co., F., 491 Washington St., Newark, N. J.

MEYER & Son, C. G., 18-20 Ann St., Tiffin, O.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.
(See page 435.)

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

MONARCH Auto Top & Supply Co., 1461 Michigan Ave., Chicago, Ill.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MULVEY & Sutorius Co., 621-23 Third Ave., S. Minneapolis, Minn.

MURRAY & Co., P. A., Newton, Mass.

MYERS Auto Top Co., Dayton, O.
(See page 435.)

NATIONAL Auto Top Co., 244-50 W. 49th St., New York, N. Y.

NEW York Auto Top & Supply Co., 267 Halsey St., Newark, N. J.

NEW York Carriage & Auto Top Co., 507 W. 30th St., New York, N. Y.

NEWTON & Son, W. H., 125 Elm St., Cortland, N. Y.

NICHOLS Co., D. P., Boston, Mass.

NORRIS Co., R. Milton, 516-18 W. Baltimore St., Baltimore, Md.

NOVELTY Carriage Works, 815-17 Second Ave., Spokane, Wash.

OHIO Top Co., 37 Main St., Cincinnati, O.
(See page 659.)

OLSEN & Son, C. J., Pittsboro, Ind.

ORANGE Carriage Co., Orange, N. J.

PARSONS-CURTIS Top Co., 1312-16 W. Harrison St., Chicago, Ill.

PEERLESS Top & Supply Co., 411-13 W. 55th St., New York, N. Y.

PHELPS, F. Z., 1243-45 Niagara St., Buffalo, N. Y.

PONTIAC Auto Accessories Co., Osmond Bldg., Pontiac, Mich.

PULLAR Co., James, 5 Mechanic St., Hartford, Conn.

RACINE Buggy Top Co., Racine, Wis.

RACINE Mfg. Co., Sixth & Main Sts., Racine, Wis.

RAND'S Mfg. Co., 67-89 Fort St., E., Detroit, Mich.

REARDON, J. J., Clark St., Amesbury, Mass.

REYNOLDS Mfg. Co., E. W., 709-11 S. 15th St., Omaha, Neb.

RITTENHOUSE Motor Co., 11-17 N. 21st St., Philadelphia, Pa.

RITTER Mfg. Co., 2724-30 N. Grand Blvd., Detroit, Mich.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 435.)

ROSS & Browne, 6127-29 Cottage Grove Ave., Chicago, Ill.

ST. Louis Automobile & Buggy Top Co., 3025 Olive St., St. Louis, Mo.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.
(See page 751.)

SEFFENS, Charles, Stoughton, Wis.

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SHUGERS Mfg. Co., 1002 S. Los Angeles St., Los Angeles, Cal.

SIMON Auto Top & Supply Co., S., 300 E. 17th St., Kansas City, Mo.

SNOW-MOSS Co., 127 W. 49th St., New York, N. Y.

SNOW & Co., N. H., Binghamton, N. Y.

SPRAGUE Umbrella Co. Norwalk, O.
(See page 433.)

SPRINGFIELD Auto Top & Upholstering Co., 102-06 Dwight St., Springfield, Mass.

SPRINGFIELD Harness Co., 27-29 Dwight St., Springfield, Mass.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 89.)

STANDARD Limousine Co., 3145-53 N. Halsted St., Chicago, Ill.

STANDARD Top Co., Kingston Station, Wilkes-Barre, Pa.

STANDARD Top & Equipment Co., 1232 Huron Rd., Cleveland, O.

STERLING Auto Top Co., 144 W. Congress St., Detroit, Mich.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

SUGNET, Geo. W., 297-301 Oak St., Buffalo, N. Y.

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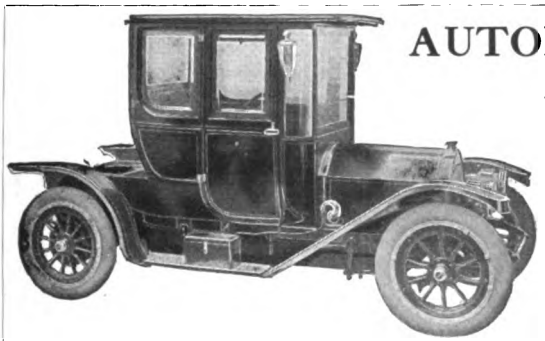

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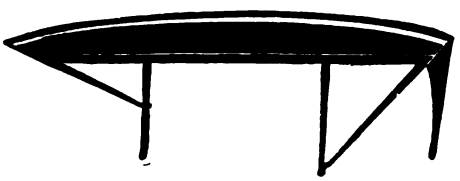

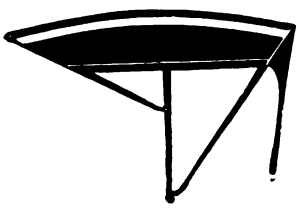

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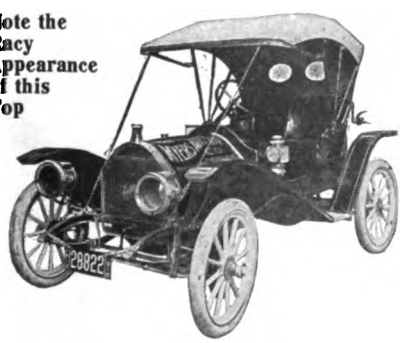

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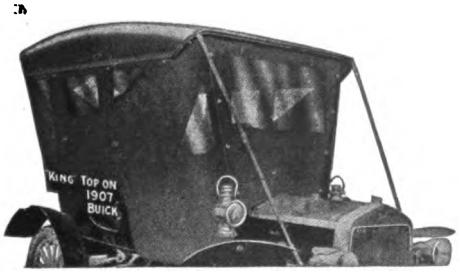

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TEEL Mfg. Co., 132 Main St., Medford, Mass.

THOMPSON Co., E. J., Forbes Field, Pittsburg, Pa.

TOWNSEND Mfg. Co., 213 W. Michigan St., Indianapolis, Ind.

TROY Carriage Sun Shade Co., Troy, O.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

VEHICLE Top & Supply Co., 900-06 Cass Ave., St. Louis, Mo. "Vesco."
(See page 433.)

VESCO—See Vehicle Top & Supply Co.

VETTER Auto Top Co., 249 W. 64th St., New York, N. Y.

WALKER & Werner, 207-13 Fayette St., Peoria, Ill.

WALKER-STOOPS Co., A. J., 218-20 W. 65th St., New York, N. Y.

WARNER Pole & Top Co., 1610 Central Ave., Cincinnati, O.

WAUGH & Co., Chas., 356-64 Main St., Cambridge, Mass.

WAYMAN & Murphy, Lake & Sangamon Sts., Chicago, Ill.

WAYNESBURG Carriage Co., Waynesburg, O.

WEISS & Son, Chas., 4801 Cottage Grove Ave., Chicago, Ill.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTCHESTER Appliance Co., Broadway & 61st St., New York, N. Y.
(See page 741.)

WESTERN Auto Top & Supply Co., 1122-26 E. 15th St., Kansas City, Mo.
(See page 437.)

WILLARD-HARLOW Mfg. Co., Janesville, Wis.

WILLIAMS Top Co., 95-97 Patterson St., Dallas, Tex.

WISCONSIN Auto Top Co., Racine, Wis. "Badger."
(See page 659.)

WISCONSIN Wagon Co., 113-23 S. Blair St., Madison, Wis.

WOOD & Son, Fred'k R., 217 W. 19th St., New York, N. Y.

WRIGHT & Co., C. E., Norfolk, Va.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

CENTRAL Tire Co., 11 W. Church St., Marshalltown, Ia. "Rock Crusher."

DEFENDER—See Tire Saving Co.

ECONOMY Tread Co., 42 W. 116th St., New York, N. Y.

EUREKA—See Green Mfg. Co.

GREEN Mfg. Co., William, 15425 Center Ave., Harvey, Ill. "Eureka."

HERCULES—See Republic Rubber Tire & Shoe Co.

HOLYOKE Tire Protector Co., 1062 Main St., Holyoke, Mass.

HUNTSVILLE Motor Car Co., Huntsville, Ala. "Burnam."

IRON Clad Tire Protector Co., Chicago, Ill.

KIMBALL Tire Case Co., 171 Broadway, Council Bluffs, Ia.

KITTERMAN Invention Co., 245 E. Randolph St., Chicago, Ill. "Skidno."

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 75.)

LYNN Auto Co., 29 Sea St., Lynn, Mass. "Barrett."

MANSFIELD Rubber Co., Mansfield, O.

MAPLEBAY Mfg. Co., Crookston, Minn.

MID-WEST Motor Supply Co., 554 W. Jackson Blvd., Chicago, Ill.

REGENT Tire Co., 3313-15 Troost Ave., Kansas City, Mo.

REPUBLIC Rubber Tire & Shoe Co., 794-98 Tenth Ave., New York, N. Y. "Hercules."

ROCK CRUSHER—See Central Tire Co.

SAMPSON Auto Co., Grand Island, Neb.

SKIDNO—See Kitterman Invention Co.

SLAMA Tire Protector Co., 1504 Grand Ave., Kansas City, Mo.

STANDARD Tire Protection Co., Saginaw, Mich.

TIRE Saving Co., 312 Fifth St., Racine, Wis. "Defender."

TRIPLE-TREAD Mfg. Co., 1545 Michigan Ave., Chicago, Ill.
(See page 385.)

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

UNIVERSAL Tire Protector Co., Angola, Ind.

WAHOO Auto Tire Protector Co., Wahoo Neb.

WALKER Auto Tire Band Co., 728 S. East St., Indianapolis, Ind.

WOODWORTH—See Leather Tire Goods Co.

ZEMAN, J. A., Tobias, Neb.

TREADS

DETACHABLE TIRE TREADS OR PROTECTORS

BAILEY & Co., C. J., 22 Boylston St., Boston, Mass.

BARRETT—See Lynn Auto Co.

BRICTSON Mfg. Co., Brookings, S. D.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BURNAM—See Huntsville Motor Car Co.

TRIMMINGS

CLOTH AND CARPET TRIMMINGS

(See also Broadcloth; also Buttons; also Carpet; also Cloth; also Lace; also Linoleum; also Silk; also Whipcord)

BARRELL Co., Wm. L., 75-77 Worth St., New York City.

BRIDGEPORT Coach Lace Co., 305 Wood Ave., Bridgeport, Conn.

CARR Co., F. S., Boston, Mass.
(See page 177.)

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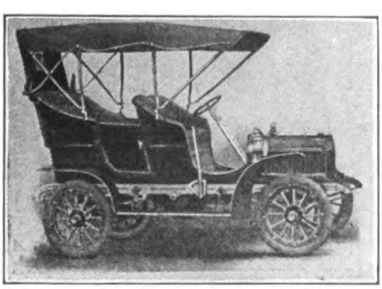

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CLOTH AND CARPET TRIMMINGS (Continued)

CHANDLER Oil Cloth & Buckram Co., E. Taunton, Mass.

CHASE & Co., L. C., Boston, Mass. (See page 149.)

DERBY & Co., W. E., 34 Greene St., New York, N. Y.

DUSENBURY & Co., Louis, 224 Fourth Ave., New York, N. Y.

FINE Woolen Co., 58-60 Worth St., New York, N. Y.

GERHAB, Jacob, 152-64 N. Third St., Philadelphia, Pa.

GERHAB & Ludlum, 305 Cherry St., Philadelphia, Pa.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y.

HOLLIDAY & Co., W. J., 326 W. Georgia St., Indianapolis, Ind.

HOOF Co., C. M., 236 E. Randolph St., Chicago, Ill.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. (See page 439.)

KENNEDY, Willing & Co., 524 Arch St., Philadelphia, Pa.

LAIDLAW, Jr., Wm. R., 213-20 W. 47th St., New York, N. Y.

LANDERS Bros. Co., Toledo, O.

LOUNSBERY & Sons, G. H., Cincinnati, O. (See page 555.)

MANUFACTURERS Selling Co., 244-50 W. 49th St., New York, N. Y.

MOSSMAN, Yarnelle & Co., Fort Wayne, Ind.

NATIONAL Hardware Co., 327-29 W. Fourth St., Cincinnati, O.

NELSON Co., A. T. A., 2528 Colerain Ave., Cincinnati, O.

NORRIS & Sons, R. W., 346-48 N. Gay St., Baltimore, Md.

PATTERSON & Greenough, 45 E. 17th St., New York, N. Y.

RARITAN Woolen Mills, 14 White St., New York, N. Y.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

ROGERS & Co., E. F., 410 Arch St., Philadelphia, Pa.

SCHERER & Co., H., Detroit, Mich.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SLATER & Sons, S., 45 E. 17th St., New York, N. Y.

SLOANE, W. & J., 19th St. & Broadway, New York, N. Y.

TEN EICK, Cornelius, 253 W. 47th St., New York, N. Y.

TIEL & Co., Geo., 413 Arch St., Philadelphia, Pa.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

WIESE & Co., Wm., 234 W. 55th St., New York, N. Y.

METAL TRIMMINGS

(See also Fasteners, Curtain; also Fittings, Top; also Forgings, Drop; also Handles, Door; also Hinges, Door; also Locks, Door; also Irons, Slat; also Irons, Top; also Mouldings, Brass; also Rests, Bow; also Separators, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Court St., Grand Rapids, Mich. (See page 351.)

BLAKESLEE Forging Co., Plantsville, Conn

BRIGHAM Brass Mfg. Co., 2333-35 Wabash Ave., Chicago, Ill. (See page 567.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. (See page 351.)

COWLES & Co., C., New Haven, Conn. (See page 351.)

CURRY Mfg. Co., J. F., 229 Mulberry St., Newark, N. J.

DOUGLAS & Lomason Co., Detroit, Mich. (See page 635.)

ENGLISH & Mersick Co., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2833-44 Spring Grove Ave., Cincinnati, O.

HIGGIN Mfg. Co., Newport, Ky. (See page 183.)

HOLLIDAY & Co., W. J., 326 W. Georgia St., Indianapolis, Ind.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2833-44 Spring Grove Ave., Cincinnati, O.

MURDOCK, Jr., Co., Jas., 116 Opera Pl., Cincinnati, O.

MURPHY Co., G. W. J., Merrimac, Mass.

NOVELTY Mfg. Co., Waterbury, Conn.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TEN EICK, Cornelius, 253 W. 47th St., New York, N. Y.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. (See page 633.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WING Co., Charles, Amesbury, Mass. (See page 733.)

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn.

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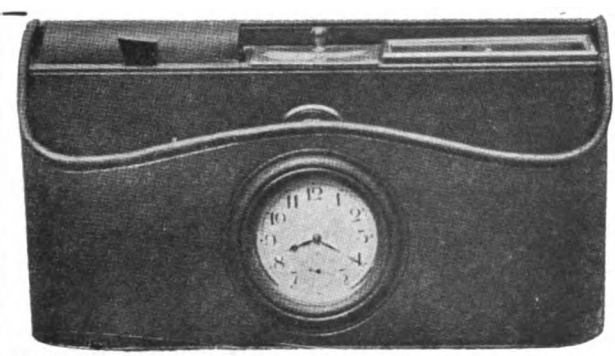

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FARLAND Auto Co., Chicago, Ill.

MOTOR Car Supply Co., 1463 Michigan Ave., Chicago, Ill.

MOTOR & Mfg. Works Co., Geneva, N. Y. (See page 295.)

PORTLAND Garage Co., Portland, Me. (See page 527.)

SIMPLEX—See Bolton, Geo. W.

TRUNKS

LEATHER AUTOMOBILE TRUNKS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y. (See page 441.)

AUTO Trunk Mfg. Co., 94 Reade St., New York, N. Y.

BAL, Wm., 14 Johnson St., Newark, N. J.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

DUPLEX—See Planet Co.

FARMERS Market Co., 711 Orange St., Wilmington, Del.

FITZGERALD Trunk Co., 1214 Wells St., Chicago, Ill.

FULLER Company, G. W., 182-184 Asylum St., Hartford, Conn.

GOLDSMITH & Son, L., Cherry & Canal Sts., Newark, N. J.

HASKELL Bros., 109 N. Wabash Ave., Chicago, Ill.

HEADLEY & Farmer Co., Newark, N. J.

INDESTRUCTO—See National Veneer Products Co.

KAMLEE Co., 348 Milwaukee St., Milwaukee, Wis. (See page 743.)

KING, W. A., 52 Public Sq., Cleveland, Ohio.

LARAMEE & Grahn, 120 S. Fourth St., Minneapolis, Minn.

MARVIN Auto Trunk Co., 63 Thomas St., New York, N. Y.

MASON, John A., 312 Washington St., Newton, Mass.

MORRISON & Co., L. E., 27 W. Washington St., Indianapolis, Ind.

MURRAY, Jos., Newton, Mass. (See page 665.)

NATHAN Novelty Mfg. Co., 83-90 Reade St., New York, N. Y. (See page 441.)

NATIONAL Veneer Products Co., Mishawaka, Ind. "Indestructo."

PLANET Co., Westfield, Mass. "Duplex."

PREMIER Novelty Mfg. Co., 72 Murray St., New York, N. Y. (See page 441.)

S. C. S.—See Simon & Co.

SIMON & Co., S. C., 1020 Race St., Philadelphia, Pa. "S. C. S."

TAYLOR Trunk Works, C. A., 39 E. Randolph St., Chicago, Ill.

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

WOHLFELD Trunk & Bag Co., 538-40 N. Third St., Philadelphia, Pa.

METAL AUTOMOBILE TRUNKS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 343.)

NATIONAL Enameling & Stamping Co., 374-78 Broadway, New York, N. Y. "Nesco."

NESCO—See National Enameling & Stamping Co.

TUBES

INNER TUBES

(For Complete Tires—See Tires, Pneumatic)

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

AJAX-GRIEB Rubber Co., Trenton, N. J.

ALPHA—See Parker, Stearns & Co.

BATAVIA Rubber Co., Batavia, N. Y.

BROWN Perfection Tube Co., 1974 Broadway New York, N. Y.

CENTURY Rubber Trading Co., 123 W. 68th St., New York, N. Y. (See page 627.)

CONTINENTAL Caoutchouc Co., 1788-90 Broadway, New York, N. Y.

CONTINENTAL Rubber Works, 19th & Liberty St., Erie, Pa.

DIAMOND Rubber Co., Akron, O. (See page 139.)

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

FEDERAL Rubber Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O. (See page 431.)

FISK Rubber Co., Chicopee Falls, Mass.

G & J Tire Co., 549 E. Georgia St., Indianapolis, Ind.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Trade St., Akron, O. "Red Seal." (See page 427.)

HARTFORD Rubber Works Co., Hartford, Conn.

HOME Tire Co., Trenton, N. J. (See page 385.)

IMPERIAL—See McGraw Tire & Rubber Co.

KANTLEEK—See Seamless Rubber Co.

KELLY-RACINE Rubber Co., Racine, Wis.

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Rubber Co., Mansfield, O.

MARSH Pneumatic Tube Co., Detroit, Mich.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MORGAN & Wright, Detroit, Mich.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y. "Alpha."

PENNSYLVANIA Rubber Co., Jeannette, Pa.

RED SEAL—See Goodyear Tire & Rubber Co.

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Inner Tube Bags	Spark Plug Kits	Trunk Covers
Joint Protectors	Starting Handle Holders	Tool Rolls
Lamp Covers		Tool Kits
Lap Robes	Storm Covers	Wash Aprons

Premier Novelty Mfg. Co., 72 Murray St. New York

NATHAN'S
AUTO FABRIC SUPPLIES
are STILL LEADING
NATHAN'S LOCK LAP BUTTONED TIRE COVER
(PATENTED)

The on'y Perfect Fitting Tire Cover that is water and dust proof when placed in any position

1910 Prices are Ready

OUR LINE—Tire Covers, Tool Rolls, Inner Tube Cases; Lamp Covers that fit, Top Covers, Dust Covers, Storm Covers; Auto Trunks; Pat. Leggins; etc. Tire and Tire Trunk Lock; Pat. Pending. Everything made of Fabric for the auto.

IMPORTANT
Get your name on our mailing list and we will keep you posted.

NATHAN NOVELTY MFG. CO.
83 to 90 READE ST., NEW YORK

STYLE K (Patent applied for)

Wood Body, Sliding Door Tire Trunk

OUR NEW ONE

The door slides up and down in a Patent Metal Groove. By removing the pad-lock, the door slides down, and the trunk can be opened in two seconds. Guaranteed dust and waterproof or no sale. All Sizes $12.00. Best Grade, $15.00. Write for discounts. Agencies can now be secured.

Ajax Trunk & Sample Case Co.
91-93 Mercer St., New York

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TUBES (Continued)

INNER TUBES (Continued)

SEAMLESS Rubber Co., New Haven, Conn. "Kantleek."
(See page 567.)

SHAWMUT Tire Co., Boston, Mass.
(See page 431.)

STAR Rubber Co., 405 Sweitzer Ave., Akron, O.

STERLING Rubber Works, Rutherford, N. J.
(See page 425.)

THERMOID Rubber Co., Trenton, N. J.
(See page 609.)

MOTOR BOAT SPEAKING TUBES

BERGER Mfg. Co., Canton, Ohio.

LAMB & Ritchie Co., Cambridgeport, Mass.

OSTRANDER & Co., W. R., 22 Dey St., New York, N. Y.

POOLE, Jas. W., 16 Columbia St., Boston, Mass.

WALSH Mfg. Co., Owen, 78 Barclay St., New York, N. Y.

SPEAKING TUBES

BRIDGEPORT Coach Lace Co., 805 Wood Ave., Bridgeport, Conn.

COLUMBIA—See Horstmann Co.

COWLES & Co., C., New Haven, Conn.
(See page 351.)

ENGLISH & Mersick Co., New Haven, Conn.

HORTSMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."
(See page 439.)

PAPE Electric & Mfg. Co., H. G., 563 Jefferson St., Buffalo, N. Y.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

SCHLEGEL Mfg. Co., 27 Canal St., Rochester, N. Y.

STRONG, M. H., 168 South Ave., Rochester, N. Y.
(See page 439.)

WATER ABSORBING TUBES

CRESCO Laboratory, New Haven, Conn.

TUBING

ALUMINUM TUBING

ALUMINUM Co. of Amer., Pittsburg, Pa.

IVINS Tube Works, Ellwood, Oak Lane Station, Philadelphia, Pa
(See page 445.)

BRASS AND COPPER TUBING

AMERICAN Tube Works, 95 Broad St., Boston, Mass.

BARCALO Mfg. Co., Buffalo, N. Y.

BENEDICT & Burnham Mfg. Co., Waterbury, Conn.

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn.
(See page 337.)

BUFFALO Copper & Brass Rolling Mill, Military Road & Hertel Ave., Buffalo, N. Y.

BUFFALO Tube Co., 259 Rano St., Buffalo, N. Y.

CHICAGO Brass Co., Kenosha, Wis.

COE Brass Mfg. Co., Torrington, Conn.

CORNELIUS, Gustave, Wolcott St., Waterbury, Conn.

DETROIT Copper & Brass Rolling Mills, Clark Ave. below Wabash R. R., Detroit, Mich.

FRENCH Mfg. Co., 142 Robbins St., Waterbury, Conn.

IVINS Tube Works, Ellwood, Oak Lane Station, Philadelphia, Pa.
(See page 445.)

MACKENZIE-WALTON Co., Pawtucket, R. I.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave. W., Detroit, Mich.

NEW Jersey Tube Co., Newark, N. J.
(See page 649.)

RANDOLPH - CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

ROME Hollow Wire & Tube Co., Rome, N. Y.
(See page 445.)

SLADE Mfg. Co., Providence, R. I.
(See page 567.)

STANDARD Brass & Copper Tube Co., New London, Conn.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WATERBURY Mfg. Co., Waterbury, Conn.

WELLS & Co., A. H., Watertown Road, Waterbury, Conn.

COPPER TUBING

(See Tubing, Brass and Copper)

DEALERS IN TUBING

(This is a list of Dealers in Tubing who advertise in this publication)

BRAUN, J. G., 615-21 S. Paulina St., Chicago, Ill.
(See page 639.)

CLEVELAND Tool & Supply Co., Cleveland, O.
(See page 447.)

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y.
(See page 447.)

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O.
(See page 675.)

PRICE & Co., C. B., Tribune Bldg., New York, N. Y.
(See page 171.)

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 651.)

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass.
(See page 445.)

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BANNISTER WHEELS

BANNISTER AUTO WHEELS are the product of thirty years' experience in wheel making, and are the best on the market today.

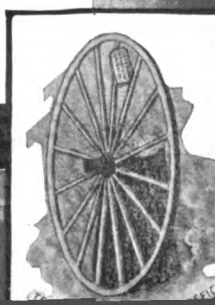
Every one is given the best care in manufacturing and inspecting that can be given by the most complete organization in the business. Quality is always assured from the fact that we produce our stock and do not have to go to the market and buy cheap grades of timber.

Our factory and manufacturing organization are always working towards the betterment of our goods.

Our trade mark insures you quality and service.

MUNCIE WHEEL CO.

MUNCIE, IND.



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BANNISTER WHEELS

ARE THE BEST

We know it.

You will if you buy them.

Send us your specifications. We give you the greatest value for your money.

MUNCIE WHEEL COMPANY

MUNCIE, IND.

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NOT LIKE OTHER VULCANIZERS

It is guaranteed to do good work. You can operate it by electric heat, gas from the gas tank or generator or by an Alcohol Heater. You can carry it on the road if you wish. FOR THE REPAIR MAN, it is a small gold mine. You do not have to live in a city having electric lights to run and make money with a Little Wonder VULCANIZER. Ask for information and prices. Thousands of these are making repair men money throughout the country. WHY NOT YOU?

We carry the largest stock of auto supplies in our section of the country. We sell exclusively to retail dealers. It will be money in your pocket to get our catalogue and prices. Write us to-day.

RICE & DAYTON MANUFACTURING COMPANY

115, 117 & 119 EAST FOURTH STREET, CEDAR FALLS, IOWA

SEAMLESS STEEL TUBING

ESPECIALLY ADAPTED TO THE USES OF

AUTOMOBILE and CYCLE MANUFACTURERS

ALSO FOR A GREAT VARIETY OF MECHANICAL PURPOSES

COMPLETE STOCK—ROUND AND SQUARE

ALSO

COLD ROLLED BRAKE BAND STEEL

O. H. Cold Rolled Sheets, Strips for Drawing and Stamping and Thin Sheets for Shims, Liners, etc.

EDGAR T. WARD & SONS

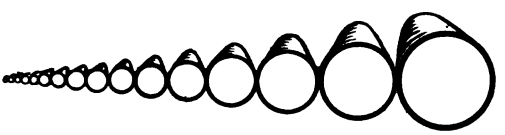
28-25 PURCHASE STREET, - - BOSTON, MASS.

AUTOMOBILE TUBING

Seamless Brass and Copper Tubing

of all kinds,—any size, any gauge; any temper.

From ½" down to the finest.



We are supplying many of the largest and best automobile concerns in the country with tubing. Why not let us quote **you** on **your** requirements? Our **QUALITY** is guaranteed,—our prices are low as quality will allow, and prompt deliveries are guaranteed. Could you possibly ask for more? **Correspondence solicited.**

ROME HOLLOW WIRE & TUBE COMPANY, Rome, New York

SEAMLESS STEEL TUBING

FINISHED BRIGHT, SMOOTH AND ACCURATE, INSIDE AND OUT

WE ALSO MAKE

Tool Steel Tubing—Soft Steel Tubing

SMALL BRASS, COPPER and ALUMINUM TUBING

PRICE LIST SENT FOR THE ASKING—WRITE FOR IT

First in America, and with one exception First in the World, to make SEAMLESS STEEL TUBING

ELWOOD IVINS TUBE WORKS OAK LANE STATION PHILADELPHIA, PA.

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TUBING (Continued)

FIBRE TUBING

(See Fibre, Hard)

FLEXIBLE METALLIC TUBING

ALMOND Mfg. Co., T. R., 1 Maple St., Ashburnham, Mass. (See page 539.)

AMERICAN Metal Hose Co., Waterbury, Conn.

AUTOMOBILE Supply Mfg. Co., 220-22 Taaffe Pl., Brooklyn, N. Y. (See page 241.)

LOMBARDI Motor Co., Derby, Conn.

OSBORNE & Stephenson Mfg. Co., Plainville, Conn.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SCHOEN-JACKSON Co., Media, Pa.

SMITH & Co., Albanus L., 1305 Arch St., Philadelphia, Pa.

STANDARD Metal Mfg. Co., Chestnut, Jefferson & Malvern Sts., Newark, N. J. (See page 775.)

HARD RUBBER TUBING

(See Rubber, Hard)

IRON-LINED BRASS TUBING

PHENIX Tube Co., 182 N. 11th St., Brooklyn, N. Y.

ROME Mfg. Co., Railroad St., Rome, N. Y.

SOFT RUBBER TUBING

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CANFIELD Rubber Co., Bridgeport, Conn.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONSOLIDATED Rubber Co., Trenton, N. J.

DIAMOND Rubber Co., Akron, O. (See page 139.)

EMPIRE Rubber Mfg. Co., Trenton, N. J.

GOODRICH Co., B. F., Akron, Ohio.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HARTFORD Rubber Works Co., Hartford, Conn.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

MATTSON Rubber Co., Lodi, N. J. (See page 431.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MILLER Rubber Co., Akron, O.

MORGAN & Wright, Detroit, Mich.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

PEERLESS Rubber Mfg. Co., 16 Warren St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn. (See page 567.)

THERMOID Rubber Co., Trenton, N. J. (See page 609.)

WALPOLE Rubber Co., Walpole, Mass.

STEEL TUBING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BECKER Steel Co., 90 West St., New York, N. Y. (Importers.)

DELAWARE Seamless Tube Co., Auburn, Pa.

DETROIT Seamless Steel Tubes Co., 841 Jefferson Ave. W., Detroit, Mich.

IVINS Tube Works, Ellwood, Oak Lane Station, Philadelphia, Pa. (See page 445.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 1451 Broadway, New York, N. Y. (Importers.) (See page 399.)

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

OHIO Seamless Tube Co., Shelby, O. (See page 447.)

PITTSBURG Seamless Steel Tube Co., Beaver Falls, Pa.

PITTSBURG Steel Products Co., Frick Bldg., Pittsburg, Pa.

PROSSER & Son, Thos., 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 403.)

STANDARD Welding Co., Cleveland, O. (See page 603.)

TURN-BUCKLES

AEROPLANE TURNBUCKLES AND EYEBOLTS

GREEN, Buel H., Los Angeles, Cal.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

WROUGHT TURN-BUCKLES

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CONTINENTAL Bolt & Iron Works, Chicago, Ill.

DETROIT Screw Works, Detroit, Mich. (See page 739.)

EBERHARD Mfg. Co., Tennyson St. & C. & P. R. R., Cleveland, O.

HASKELL Mfg. Co., Wm. H., 481 Main St., Pawtucket, R. I.

HOOPES & Townsend Co., Philadelphia, Pa.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

MERRILL Bros., Maspeth, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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PETER A. FRASSE & CO.

DISTRIBUTORS OF SHELBY COLD DRAWN SEAMLESS TUBING

2,000,000 Feet Assorted Sizes Constantly on Hand

Poldi Superior Steels, Automobile Forgings, Chrome Nickel Steels, Etc.

Tools and Supplies for Auto Manufacturers

Main Office, 417-421 Canal St., N. Y. Tube and Steel Warehouse, 142-144 Worth St.

Buffalo Branch, 50-52 Exchange St. Philadelphia Branch, 514-516 Ludlow St.

"OHIO SPECIAL"

THE MECHANICAL SEAMLESS STEEL TUBE OF QUALITY

ADOPTED BY THE MOST EXACTING USERS

"OHIO SPECIAL"

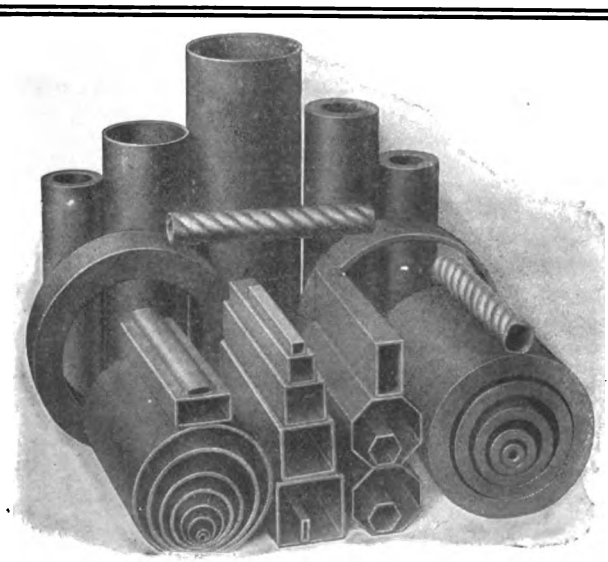
THE OHIO SEAMLESS TUBE COMPANY.

MADE IN SHELBY

HOME OFFICE SHELBY

AND FACTORY OHIO

Large Stock, Prompt Deliveries. Ask for Stock List. Eastern Sales Office, 2 Rector St., NEW YORK



Shelby Seamless Steel Tubing

Quick shipments can be had from our stock

ASK FOR OUR MONTHLY STOCK SHEET

The Cleveland Tool & Supply Co.

Distributors

CLEVELAND, OHIO

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TURN-BUCKLES (Continued)

WROUGHT TURN-BUCKLES (Continued)

MICHIGAN Bolt & Nut Co., foot Meldrum Ave., Detroit, Mich.

NEW England Bolt & Steel Co., Everett, Boston, Mass.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

WILCOX Crittenden & Co., 88 Main St., Middletown, Conn.

TURNTABLES

AUTOMOBILE TURNTABLES AND WHEEL TRUCKS

AUTOMOBILE & Accessories Mfg. Co., Continental Bldg., Baltimore, Md. "Norwood."

BICYCLE Step Ladder Co., 65 Randolph St., Chicago, Ill.

CANTON Foundry & Machine Co., Eighth & Saxon Sts., Canton, O.

DEAN—See Washburn & Granger.

ELLIOTT, Sterling, Newton, Mass.

ERNST'S Sons, C. F., Broadway & Lathrop Sts., Buffalo, N. Y.

LANSING Wheelbarrow Co., Lansing, Mich.

LINK Belt Co., Indianapolis, Ind. (See page 611.)

LUND-SMITH Co., 51 Godwin St., Paterson, N. J.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

NORWOOD—See Automobile & Accessories Mfg. Co.

PITLESS Auto Turntable Co., Kansas City, Mo. (See page 449.)

PORTLAND Garage Co., Portland, Me. (See page 527.)

SKINNER & Skinner Co., 1716 Michigan Ave., Chicago, Ill.

WASHBURN & Granger, 50 Church St., New York, N. Y. "Dean."

WEBER Cycle & Supply Co., 6 Kiowa St., Colorado Springs, Col.

TURPENTINE

BRIGHAM, Sellers & Co., Coffee Springs, Ala.

COLE-KENNEY Turpentine Co., Florala, Ala.

ELLIOTT, Henry, Florala, Ala.

HALL, G. L., Hartford, Ala.

LEWIS, D. R. & W. P., Wagar, Ala.

McLEAN & Williamson, Florala, Ala.

TWINE

TUFTING TWINE

MEYER & Co., John C., Lowell, Mass.

TRAVES Twine & Cordage Co., 73 Warren St., New York, N. Y.

UNIONS

PIPE UNIONS

(See Fittings, Pipe)

TUBING OR BRAZING UNIONS

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

UNION CINCH—See Richardson-Phenix Co.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

ZERK Mfg. Co., Columbia Bldg., Cleveland,

VALVES

ANGLE, GLOBE, CHECK AND GATE VALVES

BASHLIN Co., Warren, Pa.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CENTRAL Brass Works, 322 W. Pearl St., Cincinnati, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

EASTWOOD Wire Mfg. Co., Belleville, N. J.

HOMER Brass Works, 221 Race St., Philadelphia, Pa.

JARECKI Mfg. Co., Erie, Pa.

JENKINS Bros., 80 White St., New York, N. Y.

KELLY & Jones Co., Greensburg, Pa.

KENNEDY Valve Mfg. Co., Elmira, N. Y.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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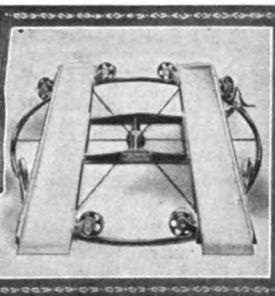
Private Garage Type Pitless Turntable for concrete approach finish with runway. This style table is also extensively used for wash stand purposes with drain in centre as shown or any other convenient location.

DROVE A CAR OVER HIS CHILD.

Unknown to Him, the Baby Had Followed Its Father to the Garage.

Beaumont, Tex., Feb. 12.—Backing his motor car out of his garage today William Crook, a lawyer, left the roadway under shrubs and getting on more power forced the car backward. Alighting, Mr. Crook found that he had run over and crushed to death his 18-month-old daughter.

Public Garage Type Pitless Turntable with steel approaches for any kind of Garage floor. May also be equipped with electric motor for revolving any fully equipped motor car continually as attractive salesroom display.



No woman should be expected to back her car. It is not only extremely difficult but very dangerous while the strength of her finger and thumb will easily turn any weight car on a Pitless Ball Bearing Table.

This accident actually occurred in front of a prominent Kansas City Garage and resulted in a $10,000 damage suit.

This accident is a daily occurrence to be seen in all parts of the world where motor cars are in use.

Why cut up your town and ruin Pitless sharp concrete edges when a Pitless Turntable will enable you progressing forward.

If You Have Any Pride

In keeping up the appearance of your premises as well as your motor car you cannot possibly afford to overlook the sanitary, clean and practical annular Ball Bearing.

PITLESS TURNTABLE

Can be installed in thirty minutes by an ordinary workman without the slightest marring or as much as a nail scratch in any public or private garage. Out of doors or in basement, on wood or concrete floors. There can only be one first cost on a PITLESS TURNTABLE because they are guaranteed FOREVER, and besides, this first cost is decidedly less than the installation expense of the hazardous, filth and danger traps of the old style turntables requiring a Pit or Building Alteration.

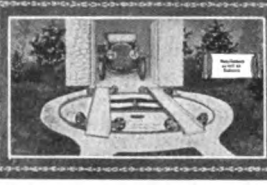
To concrete your yard in front of garage for purpose of washing and backing car around is not only to make an otherwise beautiful lawn into a very unsightly eyesore but the expense of such concrete work alone will buy several Pitless Turntables.

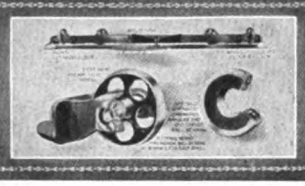
The cheapest accident insurance ever offered the Motorists is an investment in a PITLESS TURNTABLE—because it is not only wrong to back your car continually but extremely dangerous to life, limb and car, irrespective of how expert you may be in handling an automobile. The expense of one accident to car will pay for several turntables.

Write today for our ART CATALOG
Giving full particulars, weights, dimensions, etc.

PITLESS AUTO TURNTABLE CO.

FULLY PROTECTED BY PATENTS — KANSAS CITY MISSOURI — FULLY PROTECTED BY PATENTS





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REAL ESTATE AND INSURANCE

AUTOMOBILE LOCATIONS IN NEW YORK CITY A SPECIALTY

KNICKERBOCKER TRUST BLDG. 5TH AVE & 34TH ST.

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VALVES (Continued)

ANGLE, GLOBE, CHECK AND GATE VALVES (Continued)

MILWAUKEE Valve Co., 871-81 Robinson Ave., Milwaukee, Wis.

MONARCH Valve & Mfg. Co., 476 Main St., Springfield, Mass.

OHIO Brass Works, Mansfield, O.

PITTSBBURG Valve Foundry & Construction Co., 26th St. & A. V. Ry., Pittsburg, Pa.

PITTSBURGH Gage & Supply Co., 30th & Liberty Sts., Pittsburg, Pa.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

SPRINGFIELD Brass Co., 126-30 S. Limestone St., Springfield, O.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WALWORTH Mfg. Co., Boston, Mass. (See page 571.)

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

BALL CHECK VALVES

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 451 S. Jefferson St., Chicago, Ill. (See page 153.)

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa. (See page 73.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

GAS ENGINE VALVES

(For Valves in the rough—See Forgings, Drop)

CAST-O-HEAD Valve Co., 2429 University Ave., S. E., Minneapolis, Minn.

ELECTRIC Welding Products Co., Cleveland, O. (See page 463.)

HICKEY Foundry Co., 345 Ellicott Sq., Buffalo, N. Y.

LEWIS Electric Welding & Mfg. Co., 234 Cherry St., Toledo, O. (See page 463.)

MICHIGAN Engine Valve Co., 19 Gilman St., Detroit, Mich. (See page 713.)

MORGAN, B., John St., Newport, R. I.

NATIONAL Welding & Mfg. Co., 1418-30 Niagara St., Buffalo, N. Y.

GASOLINE LOCK VALVES

HILL—See Janney, Steinmetz & Co.

HUNTER Lock Co., 509 Union Trust Bldg., Detroit, Mich.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Hill." (See page 657.)

WILLIAMS Carbureter Mfg. Co., 963 William St., Buffalo, N. Y.

WILLSTAD Mfg. Co., 4742 Cottage Grove Ave., Chicago, Ill.

GATE VALVES

(See Valves, Angle)

GLOBE VALVES

(See Valves, Angle)

MIXING VALVES

(See Vaporizers)

MUFFLER CUT-OUT VALVES

APCO—See Auto Parts Co.

AREMCO—See Rothstein Mfg. Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

BARCO Brass & Joint Co., 226 N. Jefferson St., Chicago, Ill.

DUPLEX—See Western Brass Mfg. Works.

ECHO Horn Co., 5601 Carnegie Ave., Cleveland, O.

FINDEISEN & Kropf Mfg. Co., 2100 S. Rockwell St., Chicago, Ill.

FOWLER Lamp & Mfg. Co., 24th St. & Michigan Ave., Chicago, Ill. (See page 255.)

G. P.—See Piel Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Perfect." "Hux." (See page 283.)

GRAY-HAWLEY Mfg. Co., 937-43 E. Jefferson St., Detroit, Mich.

HANDY—See Lunkenheimer Co.

HERBERT, W. H., 3312 Wabash Ave., Chicago, Ill. "Little Giant."

HUSK—See Western Brass Mfg. Works.

HUX—See Garage Equipment Mfg. Co.

LITTLE GIANT—See Herbert, W. H.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O. "Handy."

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium." (See page 615.)

MOTOR & Mfg. Works Co., Geneva, N. Y. (See page 295.)

NOONAN Tool & Machine Works, A. S., 105 E. Dow St., Rome, N. Y.

PERFECT—See Garage Equipment Mfg. Co.

PIEL Co., G., 363 Rider Ave., New York, N. Y. "G. P."

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y. (See page 297.)

RADIUM—See Milwaukee Auto Specialty Co.

ROSS, M. A., Fayetteville, N. Y. "Sure Pop."

ROTHSTEIN Mfg. Co., 1941-59 Park Ave., New York, N. Y. "Aremco."

Complete Index to Classification appears on Pages 8 to 22.

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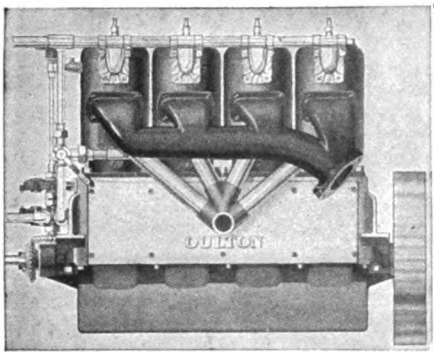

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A new type of valveless engine

Oulton Motor & Mfg. Co.

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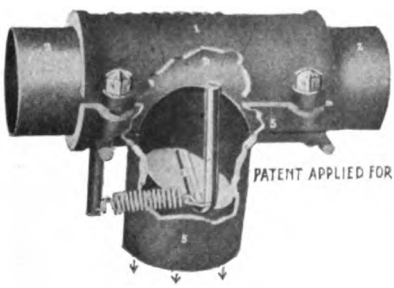


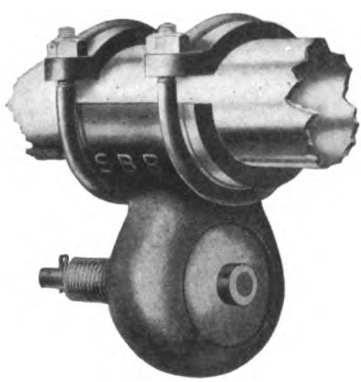
THE outlet of the Stryker Muffler Cutout is as large, in all sizes, as the exhaust pipe, consequently it will entirely relieve all back pressure.

Is machined to size and fits gas tight without brazing or packing.

Is made of brass and put together in such a way that it cannot work loose.

C. W. STRYKER, Syracuse, N. Y.

RAPIDCUT Valve Grinding Compound.



S. B. R. Muffler Cutouts, easily applied, relieves back pressure, no leakage, avoids clogging of mufflers, effective warning signal.

SMOOTH-ON Auto Repair outfits.

"BSSBX" Valve Timing Rod.

BY accurately indicating location of the piston it is possible to set all valves, and properly time explosions in make and break or other ignition systems, so as to obtain the maximum efficiency of the motor.

S. B. R. SPECIALTY CO., East Orange, N. J.

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VALVES (Continued)

MUFFLER CUT-OUT VALVES (Continued)

RUDIE—See Western Brass Mfg. Works.

S. B. R. Specialty Co., East Orange, N. J. (See page 451.)

S. M. Mfg. Co., 61 Peck St., Attleboro, Mass.

STANHOPE Forge & Machine Works, 27 Stanhope St., Boston, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STRYKER, C. W., 608 Snow Bldg., Syracuse, N. Y. (See page 451.)

SURE POP—See Ross, M. A.

WEAVER H. G., Atlanta, Ga.

WESTERN Brass Mfg. Works, 2512-22 W. 21st St., Chicago, Ill. "Husk," "Rudie," "Duplex." (See page 633.)

YANKEE Co., Utica, N. Y. (See page 297.)

NEEDLE VALVES

AMERICAN Brass & Iron Co., Crystal & Trombley Sts., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

PRESSURE REGULATING VALVES

(See Regulators, Pressure)

STEAM SAFETY VALVES

AMERICAN Steam Gauge & Valve Mfg. Co., Pope Bldg., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.

STAR Brass Mfg. Co., 166-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

STEAM THROTTLE VALVES

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

TIRE VALVES

DIEN Importation Co., Ch., 43-45 W. 34th St., New York, N. Y. (Importers.) "Edco."

EDCO—See Dien Importation Co.

HODGETTS & Son, W. J., 53 Academy St., Wallingford, Conn.

SCHRADER'S Son, A., 28-32 Rose St., New York, N. Y.

TIRE SAFETY VALVES

ARNOLD—See Tire Safety Device Co.

ARTIZAN Brass Co., 872 Lincoln Park Blvd., Chicago, Ill. "Savety."

ASHMORE & Bennett, 1900-02 E. 15th St., Kansas City, Mo.

CLAYTON, F. T., Sandwich, Mass.

NOBLO Co., 123 Westminster St., Springfield, Mass.

PRESSURETELL—See Schrader's Son.

SAVETY—See Artizan Brass Co.

SCHRADER'S Son, A., 28-32 Rose St., New York, N. Y. "Pressuretell."

TIRE Safety Device Co., 208 W. 124th St., New York, N. Y. "Arnold."

VANADIUM

AMERICAN Vanadium Co., 336 Frick Bldg., Pittsburg, Pa. (See page 693.)

VANADIUM Alloys Co., 25 Broad St., New York, N. Y.

VAPORIZERS

GASOLINE VAPORIZERS OR MIXING VALVES

ACME—See Essex Brass Co.

ESSEX Brass Co., G. B., 480-82 Franklin St., Detroit, Mich. "Acme."

GENERATOR Valve Co., 294-96 Taaffe Place Brooklyn, N. Y.

LAVIGNE Mfg. Co., 625 Commonwealth St., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

MONARCH Valve Co., 112 Front St., Brooklyn, N. Y.

NONPAREIL—See Lunkenheimer Co.

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., 904 Broadway, Cincinnati, O.

VARNISHES

AKRON Varnish Co., Akron, O.

AMERICAN Varnish Co., 1140 N. Branch St., Chicago, Ill.

ANGLO - AMERICAN Varnish Co., 53-63 Johnson St., Newark, N. J.

ARMITAGE & Co., John L., Newark, N. J.

AULT & Wiborg Co., Cincinnati, O. "Rubfast."

AUTOLAC Mfg. Co., 915 Huron Rd., Cleveland, O. (See page 329.)

BABCOCK Varnish Co., 60 Pearl St., Boston, Mass.

BECKWITH-CHANDLER Co., 320 Fifth Ave., New York, N. Y.

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SUPERFINE

AUTOMOBILE COLORS

ALL COLORS

AND

VARNISHES

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MANUFACTURED BY

JOHN W. MASURY & SON

NEW YORK

CHICAGO – ST. LOUIS – MINNEAPOLIS

ESTABLISHED 1835

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VARNISHES (Continued)

BERRY Bros., Leib & Wight Sts., Detroit, Mich.

BILLINGS-CHAPIN Co., Cleveland, O.

BOSTON Varnish Co., Everett, Mass.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y. "Kismet."

CHICAGO Varnish Co., 2100 Elston Ave., Chicago, Ill.

CINCINNATI Varnish Co., 218 E. Court St., Cincinnati, O.

CLEVELAND Varnish Co., 3111 E. 87th St., Cleveland, O.

COLUMBUS Varnish Co., Columbus, O.

CROCKETT Co., David B., Bridgeport, Conn.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

ELMENDORF Varnish Co., 845 Larrabee St., Chicago, Ill.

EMPIRE Varnish Co., 2638-42 E. 76th St., Cleveland, O.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J.

FOREST City Paint & Varnish Co., 2234 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GILLESPIE & Sons, Chas. H., 19 Dey St., Jersey City, N. J.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

GREGG—See Mound City Paint & Color Co.

HARLAND & Son, Wm., Genesee St. & Erie Canal, Buffalo, N. Y.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOPKINS—See National Varnish & Color Co.

HOTOPP Varnish Co., First & Marshall Sts., Hoboken, N. J.

KISMET—See Chase, Roberts & Co.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

McDOUGALL Varnish Co., Buffalo, N. Y.

MASURY & Son, John W., New York, N. Y.
(See page 453.)

MINETT Varnish Co., 165 Broadway, New York, N. Y.

MITCHELL Varnish Works, Camden, N. J.

MOLLER & Schumann Co., New York, N. Y.
(See page 311.)

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo. "Gregg."

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NATIONAL Varnish & Color Co., 85-91 Vesey St., Newark, N. J. "Hopkins."

PARROTT Varnish Co., Bridgeport, Conn.
(See page 727.)

PAYSON Varnish Co., 141st St. & Walnut Ave., New York, N. Y.

PRATT & Lambert, Buffalo, N. Y.

QUEEN City Varnish Co., Cincinnati, O.

RUBFAST—See Ault & Wiborg Co.

SCHRACK & Co., C., 152 No. 4th St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

STANDARD Varnish Works, 29 Broadway, New York, N. Y.

STEWART-MOWRY Co., 2214 Shields Ave., Chicago, Ill.

VALENTINE & Co., 257 Broadway, New N. Y. "Vanadium."

VANADIUM—See Valentine & Co.

WHEELER-CLOUGH Co., 2260 Elston Ave., Chicago, Ill.

FABRIC VARNISHES

AERO—See Hartford Rubber Works Co.

HARTFORD Rubber Works Co., Hartford, Conn. "Aero."

WRINKLE Paint Mfg. Co., Columbus, O.

MARINE VARNISHES

BECKWITH-CHANDLER Co., 320 Fifth Ave., New York, N. Y.

BERRY Bros., Leib & Wight Sts., Detroit, Mich.

BROOKLYN Varnish Mfg. Co., 35-37 Nostrand Ave., Brooklyn, N. Y.

CHASE, Roberts & Co., West Ave., Fifth and Sixth Sts., Long Island City, N. Y.

CROCKETT Co., David B., 277 Mountain Grove St., Bridgeport, Conn.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & CO., Samuel H., York Ave., Fourth & Callowhill Sts.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

LONGMAN & Martinez, 207 Pearl St., New York, N. Y.

LOWE Bros. Co., Dayton, O.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.
(See page 453.)

MOLLER & Schumann Co., Brooklyn, N. Y.
(See page 311.)

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

PARROTT Varnish Co, Bridgeport, Conn.
(See page 727.)

ROGERS—See Detroit White Lead Works.

SHERMAN-WILLIAMS Co., 601 Canal Rd., N. W., Cleveland, O.

SMITH & Co., Edw., Sixth St. & West Ave., Long Island City, N. Y.

STANDARD Varnish Works, 29 Broadway, New York, N. Y.

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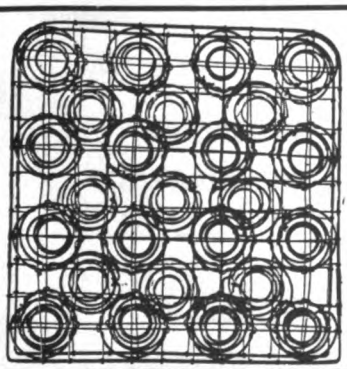

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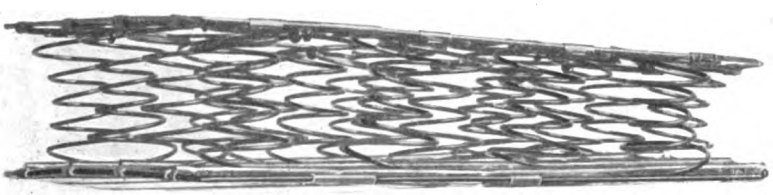

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VENTILATORS

LIMOUSINE AND FORE DOOR VENTILATORS

SMITH & Co., Jos. N., Detroit, Mich. (See page 189.)

VENTILATORS AND COWLS

AMERICAN Marine Lamp Mfg. Co., 261 Pearl St., New York, N. Y.

CURTISS Co., J. H., 2-3 South St., New York, N. Y.

GOBLET-DOLAN Co., 30 Old Slip, New York, N. Y.

SANDS & Son Co., A. B., 22-24 Vesey St., New York, N. Y.

THOMPSON Boat & Pattern Works, H. F., Decorah, Iowa.

WEBB & Sons Co., Elisha, 136 S. Front St., Philadelphia, Pa.

VOLTMETERS

(See Ammeters; also Gauges, Battery)

VULCANIZERS

TIRE VULCANIZERS

AKRON-WILLIAMS—See Williams Foundry & Machine Co.

AUTO ELECK-TRICK—See Gibney & Bro.

AUTO Parts Mfg. Co., Stroh Bldg., Milwaukee, Wis.

AUTO Steam Vulcanizer Co., First National Bank Bldg., Cincinnati, O.

AUTO-TIRE Vulcanizing Co., Lowell, Mass.

BIGGS Boiler Works Co., Akron, O.

BUFFALO Electric Vulcanizer Co., Mutual Life Bldg., Buffalo, N. Y.

BURGE Machine Works, 218-20 N. Jefferson St., Chicago, Ill. "Excelsior."

COMBINATION Steam Vulcanizer Co., 304 E. 48th St., Minneapolis, Minn.

COMET Mfg. Co., Flandrau, S. D.

CORP Bros., 38-40 Mathewson St., Providence, R. I.

ECONOMY—See Garage Equipment Mfg. Co.

ECONOMY Tool Co., 649 Pacific Electric Bldg., Los Angeles, Cal.

ELECTRIC Vulcanizer Co., 627 Third Ave., Minneapolis, Minn. "Minneapolis."

EXCELSIOR—See Burge Machine Works.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Economy." (See page 283.)

GIBNEY & Bro., Jas. L., Philadelphia, Pa. "Auto Eleck-Trick." (See page 427.)

GOODRICH Co., B. F., Akron, O.

GRIFFIN—See Motor Tire Repair & Supply Co.

GWYNN-BACON Vulcanizing Co., 215 D St., Santa Rosa, Cal.

HAYWOOD Tire & Equipment Co., Indianapolis, Ind. "Marble-Haywood."

LEADER Mfg. Co., 2336 Canal Rd., Cleveland, O.

LITTLE WONDER—See Rice & Dayton Mfg. Co.

MARBLE-HAYWOOD—See Haywood Tire & Equipment Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MILWAUKEE Auto Specialty Co., 152 Second St., Milwaukee, Wis. "Radium." (See page 615.)

MINNEAPOLIS—See Electric Vulcanizer Co.

MOTOR Tire Repair & Supply Co., 5858 Baum St., Pittsburg, Pa. "Griffin." "Pittsburg."

NATIONAL Motor Supply Co., Cleveland, O.

NEW Process Vulcanizer Co., 3230 Monroe St., Toledo, O. "Vul-car."

PITTSBURG—See Motor Tire Repair & Supply Co.

RADIUM—See Milwaukee Auto Specialty Co.

RICE & Dayton Mfg. Co., 113 W. Third St., Cedar Falls, Ia. "Little Wonder." (See page 445.)

SAVETIRE Co., Grand Rapids, Mich.

SEGERSTROM Vulcanizer Mfg. Co., 111 S. Sixth St., Minneapolis, Minn.

SHALER Co., C. A., 901 Fourth St., Waupun, Wis. (See page 635.)

VUL-CAR—See New Process Vulcanizer Co.

WEARWELL Rubber Co., 107 S. Washington St., Marion, Ind.

WILLIAMS Foundry & Machine Co., Ash St., Akron, O. "Akron-Williams." (See page 735.)

WARMERS

FOOT WARMERS

(See Heaters, Automobile)

WASHERS

FELT WASHERS

BOOTH, N. E., 644 Pacific St., Brooklyn, N. Y. (See page 457.)

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y. (See page 171.)

BRAUNSDORF, Geo. W., 232-34 E. 43d St., New York, N. Y. (See page 219.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

HOUSE & Sons, Chas. W., Unionville, Conn. (See page 743.)

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.

TINGUE-BROWN & Co., 64 Reade St., New York, N. Y.

WESTERN Felt Works, 4115-33 Ogden Ave., Chicago, Ill.

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WASHERS (Continued)

FINISHING WASHERS

AUBURN Machine Works, 290 Auburn Ave., Buffalo, N. Y. "Willard."

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

WILLARD—See Auburn Machine Works.

IRON AND STEEL WASHERS

AMERICAN Iron & Steel Mfg. Co., Lebanon, Pa.

AVERY Stamping Co., 5209 Lakeside Ave. Cleveland, O.

BETTCHER Mfg. Co., Cleveland, O. (See page 625.)

BOSSERT Co., Utica, N. Y. (See page 755.)

CLARK Bros. Bolt Co., Milldale, Conn. (See page 367.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corp., New Britain, Conn. (See page 243.)

FALLS Rivet & Machine Co., Kent, O.

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

HOEFELD & Co., R., Buffalo, N. Y.

IRELAND & Matthews **Mfg. Co.**, 51-79 Iron St., Detroit, Mich.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

McKINNEY Mfg. Co., Allegheny, Pa.

MICHIGAN Bolt & Nut Works, foot of Meldrum Ave., Detroit, Mich.

NEW England Bolt & Steel Co. (Everett), Boston, Mass.

PITTSBURG Screw **& Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.**

PLYMOUTH Mills, Plymouth, Mass.

QUADRIGA Mfg. Co., 16-18 S. Canal St., Chicago, Ill.

REPUBLIC Iron & Steel Co., Oliver Bldg., Pittsburg, Pa.

STANLEY Works, Lake St., New Britain, Conn.

STAR Ball Retainer Co., Lancaster, Pa. (See page 113.)

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

STERLING Machine & Stamping Co., Wellington, O.

TAUNTON Rivet Works, **Taunton, Mass.**

UPSON Nut Co., Unionville, Conn.

WROUGHT Washer Mfg. Co., Reynolds & Wilcox Sts., Milwaukee, Wis.

LEATHER WASHERS

AUBURN Leather Goods Co., Auburn, N. Y.

BOOTH, N. E., 644 Pacific St., Brooklyn, N. Y. (See page 457.)

CHICAGO Rawhide Co., 1301 Elston Ave., Chicago, Ill.

CLIMAX Specialty Co., Seneca Falls, N. Y.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

GRATON & Knight Mfg. Co., Worcester, Mass. (See page 385.)

HOEFELD & Co., R., **Buffalo, N. Y.**

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. (See page 339.)

QURIDE Co., Cor. N. **Salina & Turtle Sts.**, Syracuse, N. Y.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.

WOLVERINE Leather Goods Co., 59 E. Fort St., Detroit, Mich.

LOCK WASHERS

(See Nuts, Lock)

STEEL SPRING WASHERS

BARNES Co., Wallace, Bristol, Conn.

HOBBS Mfg. Co., Worcester, Mass.

VEHICLE WASHERS

ARDREY Vehicle Washer Co., Rochester, N. Y.

BURKE—See Superior Brass Mfg. Co.

CATARACT Auto-Vehicle Washer Co., 117 Van Buren St., Topeka, Kans.

DE LUXE—See Frey Auto Supply Co.

ECONOMY Vehicle Washer Co., Newburg, N. Y.

EUREKA—See Grosselfinger, Geo.

EVERREADY—See Smith Mfg. Co.

FISKE Iron Works, **J. W., 56-58 Park Pl.**, New York, N. Y.

FOREMAN Patent Swinging Hose Bracket Co., L. T., 2632 Capitol Ave., Omaha, Neb.

FREY Auto Supply Co., 700 Main St., Buffalo, N. Y. "De Luxe."

GROSSELFINGER, Geo., 83 Water St., New York, N. Y. "Eureka."

HANLEY, S. V., 859 Cambridge Ave., Milwaukee, Wis.

IDEAL Carriage Washer and Automatic Water Saver Co., 561 Main St. E., Rochester, N. Y.

IRVING—See Smith Mfg. Co.

KING, H. P., 3112 Lorain Ave., Cleveland, O.

PEORIA Overhead Vehicle Washer Co., Peoria, Ill.

PERFECT Mfg. Co., 189 Circular St., Saratoga Springs, N. Y.

PERFECTION—See Ryan & Long.

RYAN & Long, 586 Oneida St., Appleton, Wis. "Perfection." (See page 459.)

SMITH Mfg. Co., I. J., 4281 Park Ave., New York, N. Y. "Irving," "Everready." (See page 527.)

STAR Brass Works, **123 N. Jefferson St.**, Chicago, Ill.

SUPERIOR Brass Mfg. Co., 106 S. Eighth St., St. Louis, Mo. "Burke."

VEHICLE Specialty Mfg. Co., 26 State St., Hartford, Conn.

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill. (See page 459.)

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Lifts Three Feet Without Priming

Factory tests show Oberdorfer pumps to give positive pressure far exceeding that usually needed. More than ten pounds pressure is rarely required—we test each pump **at not less than eighty pounds.** That's **one** "Why" behind **one** Oberdorfer feature—water in exact proportion to engine speed.

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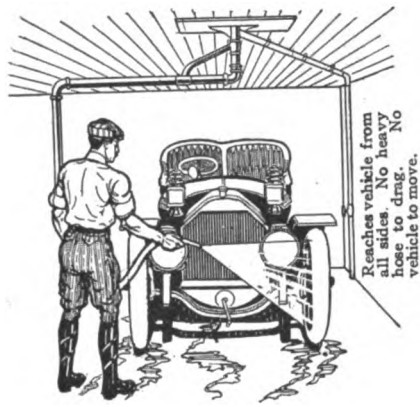

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It saves time, labor and money.
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It drains both ways.
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It is sold on honor and guaranteed.

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REACHES VEHICLE FROM ALL SIDES.
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BLAKELEY & Son, John, 1089 Germantown Ave., Philadelphia, Pa.

BRIGGS & Co., H. A., 242-52 Pine St., Pawtucket, R. I.

DORCHESTER Waste Co., 1210 Dorchester Ave., Boston, Mass.

EGAN Waste Co., 19 Burling Slip, New York, N. Y.

ESTES Mills, Fall River, Mass.

FIDELITY—See Hagy Waste Works.

FOWLER Waste Mfg. Co., 414 S. Front St., Philadelphia, Pa.

GEOGHAN & Son, A., 207 Newell St., Brooklyn, N. Y.
(See page 461.)

HAGY & Son, Clayton L., 16th & Carpenter Sts., Philadelphia, Pa.

HAGY Waste Works, J. Milton, 433 Spruce St., Philadelphia, Pa. "Fidelity."

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.
(See page 461.)

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

LILLIE Co., Dexter P., Indian Orchard, Mass.

MASSASOIT Mfg. Co., Fall River, Mass.

OLMSTED & Tuttle Co., McKinley Ave., Chicopee, Mass.

RIVERSIDE Mills, Augusta, Ga.

ROYAL Mfg. Co., 2 Rector St., New York, N. Y.

SOUTH Atlantic Waste Co., Charlotte, N. C.

SPRINGFIELD Waste Co., Springfield, Mass

STANDARD Waste Mfg. Co., 2306-10 N. American St., Philadelphia, Pa.

WATCHES

LIMOUSINE WATCHES

NEW England Watch Co., Waterbury, Conn.

WEBBING

JUTE WEBBING

LUDLOW Mfg. Associates, Boston, Mass.

SUSQUEHANNA Webbing Co., Bloomsburg, Pa.

WELDING

AUTOGENOUS WELDING

ALTON, Laine & Co., 420-24 Jackson Ave., Long Island City, N. Y.

AMERICAN Ferrofix Brazing Co., Perry Bldg., Philadelphia, Pa.

AMERICAN Oxy-acetylene Welding & Cutting Co., 2306 Olive St., St. Louis, Mo.

AUTOGENOUS Welding Equipment Co., 41 Bay St., Springfield, Mass.

BOSSERT Co., Utica, N. Y.
(See page 755.)

BOURNONVILLE & Sons, Eug., 250-52 W. 64th St., New York, N. Y.

CHICAGO Welding Co., 515 Laflin St., Chicago, Ill.

CROSBY Co., Buffalo, N. Y.
(See page 227.)

DELCAMPE Welding Co., 353 Pierce Ave., Long Island City, N. Y.
(See page 527.)

DEPPELER Co., J. H., 819 Jersey Ave., Jersey City, N. J.

EMRICH & Sons, Chas., 15 Peck Ct., Chicago, Ill.

GERLOFF, Chas. W., 300 Water St., Norfolk, Va.

GREAT Lakes Welding Co., 937-45 West St., Cleveland, O.

HENDERSON-WILLIS Welding & Cutting Co., 2024 Eugenie St., St. Louis, Mo.

INDUSTRIAL Oxygen Co., Hanover Bank Bldg., New York, N. Y.

LINDE Air Products Co., 155-83 Chandler St., Buffalo, N. Y.

MORGAN, B., John St., Newport, R. I.

NATIONAL Welding & Mfg. Co., 1418-30 Niagara St., Buffalo, N. Y.

NEW Bedford Welding Co., 177 N. Water St., New Bedford, Mass.

NORTHERN Welding & Mfg. Co., 135 N. 11th St., Minneapolis, Minn.

OHIO Welding & Mfg. Co., 828-30 W. Sixth St., Cincinnati, Ohio.

OXY-ACETYLENE Welding Co., 1921 Grand Ave., Kansas City, Mo.

OXY-CARBI Co., New Haven, Conn.
(See page 525.)

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburg, Pa.

POLLARD Engineering Co., 165-69 N. Jefferson St., Chicago, Ill.

PONDELICK Bros., 215 S. Leavitt St., Chicago, Ill.

PROVIDENCE Autogenous Welding & Mfg. Co., Providence, R. I.
(See page 461.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SCHAAP Flame Utilities Corp., 344 Cumberland St., Brooklyn, N. Y.

SMITH & Co., W. R., 304-06 W. 52d St., New York, N. Y.

STANDARD Welding Works, 121 E. 16th St., Chicago, Ill.

STANDARD Welding & Mfg. Co., 951 Main St., Buffalo, N. Y.

SUPERIOR Welding & Machine Co., Quintard Pl., Stamford, Conn.

UNION Welding Co., 632 W. 48th St., New York, N. Y.

WATERBURY Welding Works, 1148 S. Main St., Waterbury, Conn.
(See page 527.)

WESTERN Welding & Mfg. Co., 557 W. Jackson Blvd., Chicago, Ill.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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(The World's Best)

COTTON WASTE, WIPERS, POLISHING CLOTHS

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Oceanic	"	"	Ashland	"	"
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PROVIDENCE, R. I.

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WELDING (Continued)

ELECTRIC WELDING

AKRON-SELLE Co., High & Chestnut Sts., Akron, O.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 463.)

KALAMAZOO Steel Goods Co., Kalamazoo, Mich.
(See page 559.)

LEWIS Electric Welding & Mfg. Co., 234 Cherry St., Toledo, Ohio.
(See page 463.)

MICHIGAN Electric Welding Co., Third & Congress Sts., Detroit, Mich.

NATIONAL Electric Welding Co., 181 Christopher St., New York, N. Y.

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 574.)

STANDARD Welding Co., Cleveland, O.
(See page 603.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

WHEELS

AEROPLANE WHEELS

WEAVER, Jr., J. A., 956 Eighth Ave., New York, N. Y.

MOTOR BOAT PROPELLER WHEELS

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMES & Co., B. S., 700 Arch St., Williamsport, Pa.

AUTOMATIC Machine Co., 113 E. Washington Ave., Bridgeport, Conn.

BRYANT & Berry Co., 28 W. Atwater St., Detroit, Mich.

CAMDEN Anchor-Rockland Machine Co., Camden, Me.

COOLIDGE CO., L. H., 66 W. Marion St., Seattle, Wash.

CRAMP & Sons Ship & Engine Bldg. Co., Wm., Philadelphia, Pa.
(See page 281.)

FRONTIER Engineering Co., 816-36 Fort St., W., Detroit, Mich.

GILE Boat & Engine Co., Ludington, Mich.

HARTHAN—See McFarland Foundry & Machine Co.

HYDE Windlass Co., Bath, Me.

LOETZER—See Rift Climbing Boat Co.

McFARLAND Foundry & Machine Co., Trenton, N. J. "Harthan."

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

NAYES Machine Co., (S. Portland), Portland, Me. "Thompsons."

NORWALK Brass Co., Norwalk, Conn.

RIFT Climbing Boat Co., Athens, Pa. "Loetzer."

ROPER & Co., C. F., 27 Northrop St., Hopedale, Mass.

SHERIFFS Mfg. Co., Milwaukee, Wis.

STICKLER Weedless Wheel Co., Portage, Wis.

THOMPSONS—See Nayes Machine Co.

TROUT Co., H. G., Buffalo, N. Y.

MOTOR BOAT REVERSING PROPELLER WHEELS

BENTON Electric Co., 106-08 Pearl St., La Crosse, Wis.

CAMDEN Anchor-Rockland Machine Co., Camden, Me. "Knox."

CHAMPAIGN Bros., 800 W. Buffalo St., Ithaca, N. Y.

DONNELLY, Wm. T., 18 Battery Pl., New York, N. Y.

FRONTIER Engineering Co., 816-36 Fort St., W., Detroit, Mich.

GILE Boat & Engine Co., Ludington, Mich.

GORDON Propeller Co., 9000 Desmond Ave., Cleveland, O.

KNOX—See Camden Anchor-Rockland Machine Co.

LEIGHTON, H. J., 1017 W. Fayette St., Syracuse, N. Y.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

ROPER & Co., C. F., 27 Northrop St., Hopedale, Mass.

STILES Mfg. Co., First & Market Sts., Parkersburg, W. Va.

WEST Seattle Machine Works, ft. Maryland St. (W. Seattle), Seattle, Wash.

WILMARTH & Morman Co., 589 Canal St., Grand Rapids, Mich.

MOTOR BOAT STEERING WHEELS

AMERICAN Wood Rim Co., Onaway, Mich.

BRYANT & Berry Co., 28 W. Atwater St., Detroit, Mich.

COLEMAN, J. C., 58-60 First St., Detroit, Mich.

EDSON Mfg. Co., 255-57 Atlantic Ave., Boston, Mass.

LOCKWOOD Mfg. Co., Boston, Mass.

MARINE Hardware Co., Peabody, Mass.

MARINE Hardware & Equipment Co. (S. Portland), Portland, Me.

MARINE Iron Works, Chicago, Ill.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

SEELY Mfg. Co., J. A., N. Water & Division Sts., Ogdensburg, N. Y.

SHERWELL, Chas. H., Ogdensburg, N. Y.

VALENTINE & Co., F. J., 178 Vermont St., Buffalo, N. Y.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

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Nickel heads and low carbon steel valve stems, electrically welded.

Gray iron heads and low carbon stems, seats and stems ground to perfect alignment.

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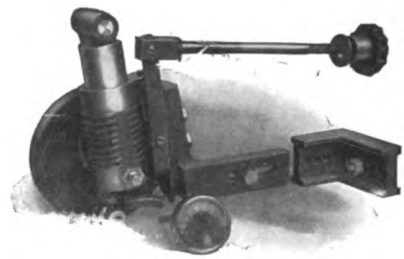

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A gauge to tell you correct pressure. Simply connect hose, turn hand wheel. No wrenches needed. Cylinder air-cooled, never heats. Can be attached to any car. Every M. & L. Pump tested to 150 lbs. and guaranteed a whole year. **Order Today.**

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FINISHED VALVE STEMS

WITH NICKEL STEEL HEADS
CARBON STEEL STEMS

THE ELECTRIC WELDING PRODUCTS CO.
CLEVELAND OHIO

By finished valve stems we mean valve stems that are machined complete in every detail, then ground to within .0005 on the seat and stem, all ready to seat in your engine.

Surely this appeals to you, for why should you continue to buy rough forgings to be machined and ground when you can buy our better nickel steel head—carbon steel stem combination valve stem at a price less than your own cost, without the trouble of doing any work on them.

Nickel steel is acknowledged by all who have tried it to be the best valve metal known, as it does not warp, pit nor corrode, and carbon steel, for obvious reasons, is the best stem metal.

Our valves are made by our proven electric welding process and given a most thorough heat treatment after welding. Furthermore, they are guaranteed, so you take no chances whatever.

The principal manufacturers of automobiles and motors in the country now use them--why not you, too?

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WHEELS (Continued)

SPECIAL PNEUMATIC, SPRING AND EMERGENCY WHEELS

AMERICAN Wheel Co., 409 Prospect Ave., S. W., Cleveland, O.

BURROWES Co., E. T., Portland, Me.

DE JARNETTE—See Eby Mfg. Co.

EBY Mfg. Co., York, Neb. "De Jarnette."

FLEXIBLE Tire Co., East Hampton, Mass.

GRUSS Spring Wheel Co., 221 Market St., San Francisco, Cal.

JENKINS Emergency Wheel Co., Richmond, Va.
(See page 773.)

KELSEY Wheel Co., 1230-40 Military Ave., Detroit, Mich.

LEA—See Tractor Engineering Co.

MULTIPLE Spring Wheel Co., 40 Huntington Ave., Boston, Mass.

SCHNEIDER Mfg. Co., 42 Broadway, New York, N. Y.

STEPNEY—See United States Wheel & Rim Co.

TRACTOR Engineering Co., Lamberton & Lalor St., Trenton, N. J. "Lea."

UNITED States Wheel & Rim Co., St. Anne, Ill. "Stepney."

STEERING WHEELS

AMERICAN Wood Rim Co., Onaway, Mich.

BRISCOE Mfg. Co., Detroit, Mich.
(See pages 341 and 342.)

CENTAUR Motor Co., Buffalo, N. Y.
(See page 514.)

COLEMAN, J. C., 58-60 First St., Detroit, Mich.

DETROIT Steering Wheel & Wind Shield Co., 74-78 Fort St., E. Detroit, Mich.
(See page 371.)

EBY Auto Parts Co., 470 Lawton Ave., Detroit, Mich.
(See page 687.)

GOERSS, Herman, 162 Russell Ave., Cleveland, O.

HASTINGS & Anderson, 45-47 E. Lake St., Chicago, Ill.

RASTETTER & Son, Louis, Nelson & Wall Sts., Ft. Wayne, Ind.

WAYNE Cabinet Co., Detroit, Mich.

WIRE WHEELS

STE-EL-ASTIC—See Whiteside Wheel Co.

WHITESIDE Wheel Co., Canal & W. 10th Sts., Indianapolis, Ind. "Ste-el-astic."

WOOD WHEELS

ARCHIBALD Wheel Co., 150 West St., Lawrence, Mass.

AUTO Wheel Co., Lansing, Mich.
(See page 627.)

BALTIMORE Hub-Wheel & Mfg. Co., 326-32 N. Holliday St., Baltimore, Md.

BANNISTER—See Muncie Wheel Co.

BIMEL Spoke & Auto Wheel Co., Portland, Ind.

CENTRAL City Wheel Works, Syracuse, N. Y.

CRANE & MacMahon, 8-10 Bridge St., New York, N. Y. "Nut."

DEFIANCE—See Turnbull Wagon Co.

EBERLY & Orris Mfg. Co., Mechanicsburg, Pa.

EMPIRE Wheel Works, 174 South St., Utica, N. Y.

HAYES Wheel Co., Jackson, Mich.
(See page 575.)

HOOPES Bros. & Darlington, West Chester, Pa.

IMPERIAL Wheel Co., St. John & Hamilton Sts., Flint, Mich.

JONES & Co., Phineas, Newark, N. J.
(See page 699.)

KELSEY Wheel Co., 1230-40 Military Ave., Detroit, Mich.

MEEKER Mfg. Co., Linden & Hoffman Aves., Dayton, O.

MUNCIE Wheel Co., Muncie, Ind. "Bannister."
(See pages 443 and 444.)

NEW Haven Carriage Co., Water & Franklin Sts., New Haven, Conn.

NUT—See Crane & MacMahon.

PRUDDEN & Co., W. K., Lansing, Mich.

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See pages 582 and 583.)

SCHWARZ Wheel Co., Philadelphia, Pa.
(See page 465.)

SHORTSVILLE Wheel Co., Shortsville, N. Y.
(See page 699.)

STANDARD Wheel Co., Terre Haute, Ind.

TURNBULL Wagon Co., Defiance, Ohio. "Defiance."
(See page 767.)

WAPAKONETA Wheel Co., Wapakoneta, O.

WAVERLEY Co., Indianapolis, Ind.

WAYNE Wheel Co., Newark, N. Y.
(See page 699.)

WHEEL & Wood Bending Co., 141 John St. Bridgeport, Conn.

ZWICK & Greenwald Wheel Co., Linden & Hoffman Sts., Dayton, O.

WHIPCORD

UPHOLSTERY WHIPCORD

ROY Woolen Co., Watervleit, N. Y.

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

WHISTLES

EXHAUST WHISTLES

(See Horns, Exhaust)

MOTOR BOAT WHISTLES

AUTO Equipment Mfg. Co., 18 Pearl St., Newton, Mass. "Ellison."

BRUNNER Mfg. Co., Utica, N. Y.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

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Twelve Reasons Why The

Schwarz Wheel

Should be selected for Automobiles and Heavy Vehicles

1 **Best Materials**

2 **Strength evenly distributed**

3 **Runs true—always**

4 **Withstands greatest strain.**

5 **Outlasts all others**

6 **Elasticity**

7 **Absolute spoke support**

8 **Interlocking tenons immovability**

9 **Can be made and shipped without hub**

10 **Scientific perfection**

11 **Economical**

12 **Strong**

The Spokes Can Never Work Loose

When a wheel under heavy strain becomes shaky and ceases to run true, the trouble is in the spoke support. The Schwarz Patent Spoke is scientifically made to be assembled under pressure, so as to *interlock*, producing a compact body of great supporting strength evenly distributed.

We use only the best materials throughout. The wood wheel can be completed with metal rim and shipped without a hub.

The Best and Strongest Artillery Wheel Made

PROMPT SERVICE NOW
LARGER FACILITIES SOON
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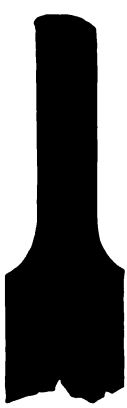

SCHWARZ Patent Spoke

Schwarz Wheel Co.

Philadelphia Penn.

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WHISTLES (Continued)

MOTOR BOAT WHISTLES (Continued.)

ELLISON—See Auto Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., Detroit, Mich.

HERZ & Co., Puck Bldg., New York, N. Y.
(See page 335.)

LUNKENHEIMER Co., 223 E. Eighth St., Cincinnati, O.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

SAGAMORE Engine Co., 74-78 Sagamore St., Lynn, Mass.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

TEC—See Transportation Equipment Co.

TRANSPORTATION Equipment Co., 186 Fulton St., New York, N. Y. "Tec."

WATRES Mfg. Co., 50 Church St., New York, N. Y.

YANKEE Co., Utica, N. Y.
(See page 297.)

WINCHES

MOTOR BOAT WINCHES, WINDLASSES AND CAPSTANS

AMERICAN Ship Windlass Co., Providence, R. I. "Providence." "Williamson."

DAKE Engine Co., Grand Haven, Mich.

HYDE Windlass Co., Bath, Me.

LAUGHLIN Co., Thos., 143 Fort St., Portland, Me.

LAWLEY & Son Corp., Geo., Neponset, Mass.

MARINE Hardware Co., Peabody, Mass.

MARINE Mfg. & Supply Co., 158 South St., New York, N. Y.

PROVIDENCE—See American Ship Windlass Co.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WILLIAMSON—See American Ship Windlass Co.

WICKING

CANDLE WICKING

BISHOP Mfg. Co., Robert, (S. Boston) Boston, Mass.

COLLINS, G. S., Central Village, Conn.

ESTES Mills, Fall River, Mass.

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.
(See page 461.)

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

LEES Mfg. Co., 320 Broadway, New York, N. Y.

MASSASOIT Mfg. Co., Fall River, Mass.

WESTPORT Mfg. Co., Fall River, Mass.

WICKS

LAMP WICKS

ANSONIA Co., O. & C., Ansonia, Conn.

CONSOLIDATED Duck Co., 86 Worth St., New York, N. Y.

FLETCHER Mfg. Co., Providence, R. I.

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

LEES Mfg. Co., 320 Broadway, New York, N. Y.

NEW Jersey Wick Co., Newark, N. J.

WINDINGS

SECONDARY WINDINGS

ACME Wire Co., New Haven, Conn.
(See page 467.)

WIPERS

WIPERS AND POLISHING CLOTHS

(For Cotton Waste—See Waste, Cotton)

CHICAGO Sanitary Rag Co., 2527-29 Homer St., Chicago, Ill.

DETROIT Sanitary Rag Co., 267 E. Hancock Ave., Detroit, Mich.

GEOGHAN & Son, A., 207 Newell St., Brooklyn, N. Y.
(See page 461.)

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.
(See page 461.)

LYMAN Co., John R., Springfield, Mass.

MARCUS & Bro. Corp., M. H., Nepera Park, N. Y.

MILL Remnants Co., 102-04 Greenwich St., New York, N. Y.

NORTH & SON, Jos. W., Elizabeth, N. J.

REACH, A. L., 91 Bedford St., Boston, Mass.

WIRE

BOWDEN WIRE

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.)
(See page 81.)

INSULATED WIRE

ACME Rubber Mfg. Co., E. State St., Trenton, N. J.

ACME Wire Co., New Haven, Conn.
(See page 467.)

AMERICAN Electrical Works, Providence, R. I.

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U. S. of America

Dear Sir—Ask any leading maker of Ignition Apparatus where he gets his

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If he is an honest man he will say from

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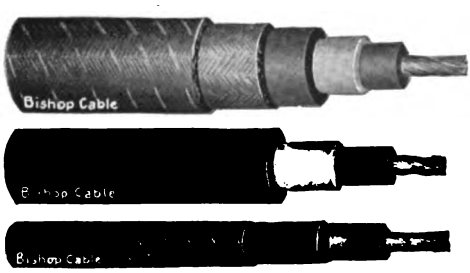
The Acme Wire Co.
New Haven, Conn.

Next time you order IGNITION CABLE It will pay you to specify "BISHOP"

BISHOP IGNITION CABLE positively will outlast any other make on the market. This is due to the way it is made and the material it is made from—new Para rubber so perfectly compounded and vulcanized that it will stand *double* the voltage ever required in service—impregnated with a special compound which makes it positive proof against heat, oil, grease and water—that's why it lasts. In addition to this impregnation of the rubber itself, we coat the Braided Cable with a superior flexible enamel, thoroughly baked on. Every foot is electrically tested before shipment.



TYPE	Diameter Millimeters	Approx. Weight per 1000 Ft.	List Prices per Ft
A	5	36 lbs.	$0.06
B	6	32 "	.07
C	7	60 "	.12
D	9	98 "	.16
E	10	110 "	.18
F	12	145 "	.25
G	12	132 "	.20
H	15	280 "	.45

Bishop Gutta-Percha Co., 426 East 25th Street NEW YORK

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WIRE (Continued)

INSULATED WIRE (Continued)

AMERICAN Steel & Wire Co., Chicago, Ill.
(See page 725.)

ATLANTIC Insulated Wire & Cable Co., 120 Liberty St., New York, N. Y.

B. I. W.—See Boston Insulated Wire & Cable Co.

BISHOP Gutta-Percha Co., 426 E. 25th St., New York, N. Y.
(See page 467.)

BOSTON Insulated Wire & Cable Co., Boston, Mass. "B. I. W."
(See page 623.)

BOURN Rubber Co., Providence, R. I.

DIAMOND Rubber Co., Akron, O.
(See page 139.)

EAGLE—See Marion Insulated Wire & Rubber Co.

EMPIRE Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

GENERAL Electric Co., Schenectady, N. Y.

GROSSMAN Co., Emil, 248-50 W. 54th St., New York, N. Y. "Red Rib."

HABIRSHAW Wire Co., 253 Broadway, New York, N. Y.

HAZARD Mfg. Co., Wilkesbarre, Pa.

INDIANA Rubber and Insulated Wire Co., Jonesboro, Ind.

MARION Insulated Wire & Rubber Co., Eighth St. & Big Four Ry., Marion, Ind. "Eagle."

NATIONAL India Rubber Co., Bristol, R. I.

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

PACKARD Electric Co., 309 Dana Ave., Warren, O.
(See page 469.)

PIRELLI & Co., 232 W. 58th St., New York, N. Y. (Importers.)

RED RIB—See Grossman Co.

ROEBLING'S Sons Co., John A., Trenton, N. J.

SAFETY Insulated Wire & Cable Co., 114 Liberty St., New York, N. Y.

SIMPLEX Electrical Co., 201 Devonshire St., Boston, Mass.

STANDARD Underground Cable Co., Westinghouse Bldg., Pittsburg, Pa.

PHOSPHOR BRONZE WIRE

ELEPHANT—See Phosphor Bronze Smelting Co.

PHOSPHOR Bronze Smelting Co., 2300 Washington Ave., Philadelphia, Pa. "Elephant."
(See page 543.)

RIVERSIDE Metal Co., Riverside, N. J.

STEEL SPRING WIRE

AMERICAN Steel & Wire Co., Chicago, Ill.
(See page 725.)

HELMUTH Co., L., 22 State St., New York, N. Y. (Importers).

INDEPENDENT Steel & Wire Co., House Bldg., Pittsburg, Pa.

KIDD Bros. & Burgher Steel Wire Co., Alliquippa, Pa.

MORGAN Spring Co., Worcester, Mass.
(See page 393.)

ROEBLING'S Sons Co., John A., Trenton N. J.

SPENCER Wire Co., Worcester, Mass.

TRENTON Iron Co., Trenton, N. J.

WOOL

STEEL WOOL

AMERICAN Steel Wool Mfg. Co., 451 Greenwich St., New York, N. Y.

BUEHNE Steel Wool Co., 93 Nassau St., New York, N. Y.

WRENCHES

VALVE PLUNGER WRENCHES

(For taking Plungers out of Tire Valves)

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

ZINC

SHEET ZINC.

ILLINOIS Zinc Co., Peru, Ill.

McVOY Sheet & Tin Plate Co., 344-50 W. Michigan St., Chicago, Ill.

MATTIESSEN & Hegeler Zinc Co., LaSalle, Ill.

SANDOVAL Zinc Co., 410 N. Peoria St., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 22.

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Packard CABLE

Is the Standard of the World

It is so constructed as to successfully withstand the CONTINUOUS presence of HEAT, GREASE, OILS and MOISTURE, the arch-enemies of rubber in all forms. Briefly, it is HERMETICALLY SEALED from every deteriorating influence, resulting in YEARS of satisfactory service.

IT ALWAYS INSPIRES CONFIDENCE

Mr. Buyer:

Look at the wiring on the car you contemplate buying. Sure you can easily re-wire it, but if the "pruning process" has been applied to the wiring (which represents less than one-hundredth of one per cent.) don't you suppose the larger cost factors have had, relatively, similar attention.

Mr. Manufacturer:

Can you afford to cast suspicion on your product by the neglect of the wiring of the ignition system which is as important as it is small? Remember, failure here puts your car (no matter what horse-power) at the mercy of a pair of mules, whose Yankee driver has his proverbial eye for business! Such experiences do not give the most favorable kind of publicity. Even if your monogram could be made to vanish on such occasions, you still have an undesirable asset—A RILED PATRON.

Packard Cable is What You Need

It lasts for years, where others barely last a single season. Accept no Substitute. New line of Electric Lighting Cables now ready.

Send for samples and prices before ordering elsewhere.

The Packard Electric Co.

309 Dana Ave., Warren, Ohio

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MACHINERY, TOOLS, SHOP EQUIPMENT AND SUPPLIES

ANVILS

BLACKSMITHS AND MACHINISTS ANVILS

AMERICAN Wrought Anvil Co., Brooklyn, N. Y.

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

COLUMBIAN Hardware Co., Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O. "Trenton."

EAGLE—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Eagle."
(See page 565.)

HAY-BUDDEN Mfg. Co., Brooklyn, N. Y.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

PETER WRIGHT—See Wiebusch & Hilger.

TRENTON—See Columbus Forge & Iron Co.

WIEBUSCH & Hilger, New York, N. Y. (Importers.) "Peter Wright."

BALLS

BURNISHING BALLS

ABBOTT Ball Co., Hartford, Conn.
(See page 555.)

BARRELS

TUMBLING BARRELS

ABBOTT Ball Co., Hartford, Conn.
(See page 555.)

BAIRD Machine Co., Oakville, Conn.

BARNETT Foundry Co., Oscar, Newark, N. J.

BYRAM & Co., Detroit, Mich.

CALUMET Engineering Works, Harvey, Ill.

CLEVELAND Tumbling Barrel & Mfg. Co., Cleveland, O.

GILMOUR, J., New York, N. Y.

GLOBE Machine & Stamping Co., Cleveland, O.
(See page 99.)

HENDERSON Bros., Waterbury, Conn

NORTHERN Engineering Works, Detroit, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 533.)

PERKINS Co., Henry, Bridgewater, Mass.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

STANDARD Machinery Co., Providence, R. I.

STOVER Mfg. Co., Freeport, Ill.

WATERBURY Machine Co., Waterbury, Conn.

WHITING Foundry Equipment Co., Harvey, Ill.

BARS

BORING BARS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

HILL Standard Mfg. Co., Anderson, Ind.

KELLY Reamer Co., Cleveland, O.

KRIEGER Tool & Mfg. Co., Grand Rapids, Wis.

MATTHEWS-DAVIS Tool Co., St. Louis, Mo.

O. K. Tool Holder Co., Shelton, Conn.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNDERWOOD & Co., H. B., Philadelphia, Pa.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BASKETS

DIPPING BASKETS

SMITH & Co., Edward F., New Haven, Conn

WISCONSIN Wire & Iron Works, Milwaukee, Wis.

BEARINGS

OILLESS BEARINGS

ARGUTO Oilless Bearing Co., Philadelphia, Pa.

BELLOWS

HAND BELLOWS

(Blacksmiths and Molders)

BRAND Co., S. H., Chicago, Ill.

CHRISTEN Bellows & Mfg. Co., St. Louis, Mo.

DOBSON, Wm., Canastota, N. Y.

HILL & Griffith Co., Cincinnati, O.
(See page 479.)

KEESE, Chas. H., New York, N. Y.

OSBORN Co., J. M. & L. A., Cleveland, O.

PARO, Edward, Chicago, Ill.

WOODASON, Thos., Philadelphia, Pa.

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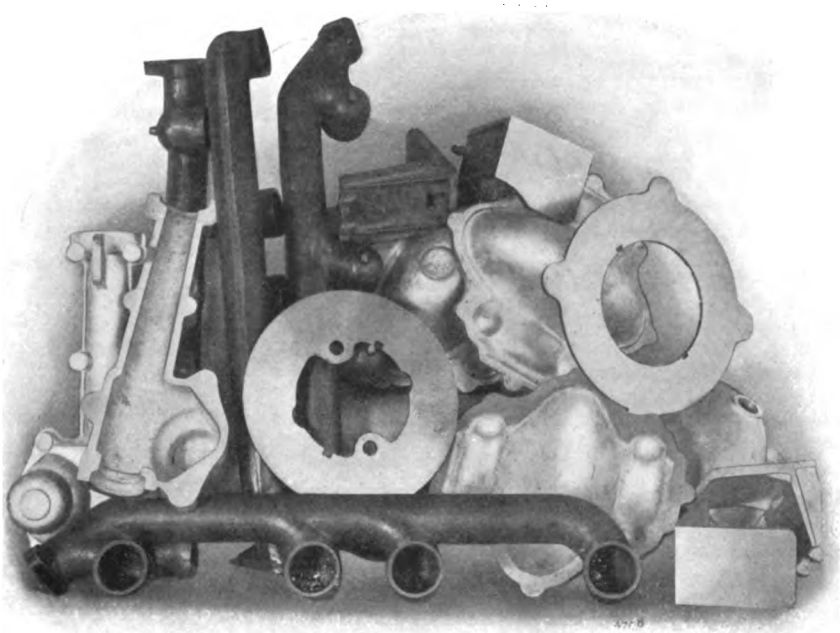
For the Manufacture of

Automobile, Aeroplane and Auto-Marine Motor Parts

Where extreme accuracy, perfect fit, and exceptional lightness are pre-eminent



Aeroplane and Automobile Aluminum Engine. Parts ground on a P. & W. Vertical Surface Grinder.

The P. & W. Vertical Surface Grinder

This machine takes an important part to increase engine efficiency and reduce manufacturing costs.

It dispenses with all surface milling and shaping operations.

Works from 10 to 25 times faster than any other method of surface reduction, and directly on the hardened castings or forgings.

Grinds any metal or alloy of any shape and permits grinding to the least possible dimensions that modern practice requires to secure extreme lightness in motor parts.

Grinds a perfect surface with a mirror finish—absolutely flat—and exact to within 0.0002 inch. Saves tedious and expensive lapping or scraping operations.

Permits machine parts to be hardened before machining without any regards to warping tendencies, as all warping errors can be corrected later by *flat* surface grinding.

Write for the book, "Grinding, Not Milling."

PRATT & WHITNEY COMPANY

HARTFORD, CONN. : : : : : U. S. A.

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BENDERS

ANGLE BENDERS

(Hand Power)

BERTSCH & Co., Cambridge City, Ind.

EXCELSIOR Tool & Machine Co., E. St. Louis, Ill.

HINMAN & Co., D. A., Sandwich, Ill.

WALLACE Supply Co., Chicago, Ill.

BITS

AUGER BITS

AMERICAN Auger Bit Co., Forestville, Conn.

BROWN & Co., R. H., New Haven, Conn. "Clark's."

CHESTER Mfg. Co., Chester, Conn.

CLARK'S—See Brown & Co.

CONNECTICUT Valley Mfg. Co., Centerbrook, Conn.

DEUSE, J. S., Chester, Conn.

FORSTNER—See Progressive Mfg. Co.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

IRWIN Auger Bit Co., Wilmington, O.

IVES Mfg. Co., W. A., Wallingford, Conn. "Mephisto."

JENNINGS & Co., C. E., New York, N. Y.

KILBORN & Bishop Co., New Haven, Conn.

MEPHISTO—See Ives Mfg. Co.

OHIO Tool Co., Columbus, O.

PROGRESSIVE Mfg. Co., Torrington, Conn. "Forstner."

RUSSELL-JENNINGS Mfg. Co., Chester, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

SWAN Co., Jas., Seymour, Conn.

BLADES

HACK SAW BLADES

(For Hack Saw Frames—See Frames, Hack Saw)

A. A. A.—See Atkins & Co.

ARROW HEAD—See Jennings & Co.

ATKINS & Co., E. C., Indianapolis, Ind. "A. A. A."

BOSTON Saw & Tool Co., Boston, Mass. "Champion."

CHAMPION—See Boston Saw & Tool Co.

CHROMOL—See Disston & Sons.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Chromol."

ELLIS Co., New Haven, Conn.

EUREKA-YANKEE—See Thompson & Son Co.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

GRIFFIN Co., G. W., Franklin, N. H.

JENNINGS & Co., C. E., New York, N. Y. "Arrow Head."

MASSACHUSETTS Saw Works, Chicopee, Mass. "Victor."

MILFORD—See Thompson & Son Co.

MILLERS Falls Co., New York, N. Y.

OLDHAM & Sons, Joshua, Brooklyn, N. Y.

QUALITY Saw & Tool Works, Springfield, Mass.

SIMONDS Mfg. Co., Fitchburg, Mass.

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

TT.—See Thompson & Son Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Milford," "Eureka-Yankee," "XL," "TT."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

XL—See Thompson & Son Co.

WEST Haven Mfg. Co., New Haven, Conn. "Universal," "Utility."

BLOCKS

CHAIN BLOCKS

(See Cranes, Portable)

BLOWERS

PRESSURE BLOWERS

AMERICAN Blower Co., Detroit, Mich.

AMERICAN Gas Furnace Co., New York, N. Y.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, "Seavey."

CONNERSVILLE Blower Co., Connersville, Ind.

HOYSTRADT & Case, Kingston, N. Y.

NATIONAL Blower Works, Milwaukee, Wis.

NEW York Blower Co., Chicago, Ill.

PIQUA Blower Co., Piqua, O.

ROOTS Co., P. H. & F. M., Connersville, Ind.

ROYAL—See Canedy-Otto Mfg. Co.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILBRAHAM-GREEN Blower Co, Pottstown, Pa.

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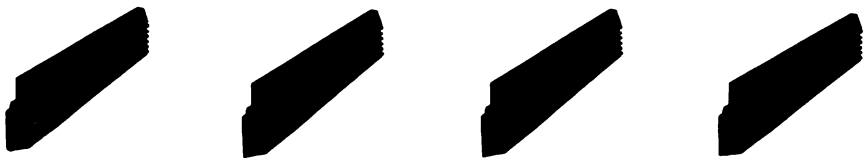

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LANDIS DIES?

They will save money for you

One Automobile manufacturer says:

"We reduced the cost of threading the ends of our crankshafts from 40 cts. each to 20 cts. each."

More Landis Bolt Cutters used by Automobile builders than any other make on account of the quality and quantity of the work produced.

Many operations being done on these machines, formerly done on thread millets or lathes.

Will be pleased to give you references. Do you want our catalogue?

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Waynesboro, Pa.
New York Office, 50 Church St.
The Walter H. Foster Co., Mgrs.

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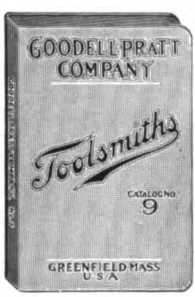
For Repairers and Builders



We manufacture an extensive line of tools which are useful in any repair shop or assembling room. We are now supplying them to some of the leading manufacturers. Most of the supply houses carry them in stock.

We issue a 208-page Catalog describing these tools, which we will Mail Free to Any Address.

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GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

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PLUMB BOBS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

PECK, Stow & Wilcox Co., Southington, Conn.

READING Hardware Co., Reading, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

WELCH Co., Thomas F., Boston, Mass.

BOXES

ANNEALING AND CASE HARDENING BOXES

LEETONIA Boiler Co., Leetonia, O.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NATIONAL Mfg. Co., Pittsburg, Pa.

RITER-CONLEY Mfg. Co., Pittsburg, Pa.

WARREN City Boiler Works, Warren, O.

WILFONG Bros., Philadelphia, Pa.

MITRE BOXES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "Dorn's."

DORN'S—See Braunsdorf-Mueller Co.

GOODELL Mfg. Co., Greenfield, Mass.

LANGDON—See Millers Falls Co.

MARSH Co., H. C., Rockford, Ill.

MILLERS Falls Co., New York, N. Y. "Langdon."

NICHOLLS Mfg. Co., Ottumwa Ia.

SEAVEY—See Smith & Hemenway Co.

SHELDON & Co., E. H., Chicago, Ill.

SMITH & Hemenway Co., New York, N. Y. "Seavey."

STANLEY Rule & Level Co., New Britain, Conn.

STAR Miter Machine Co., Rockford, Ill.

SHEET METAL TOTE BOXES

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

FEDERAL Steel Fixture Co., Chicago, Ill.

KILBOURNE & Jacobs Mfg. Co., Columbus, O.

LYON Metallic Mfg. Co., Aurora, Ill.

OHIO Mfg. Co., Painesville, O.

TERRELLS Equipment Co., Grand Rapids, Mich.

BRACES

BIT BRACES

AMERICAN—See Turner & Deegan.

BARBER—See Miller Falls Co.

BARBERS—See Turner & Deegan.

FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

IVES Mfg. Co., W. A., Wallingford, Conn.

LANCASTER Machine & Knife Works, Lancaster, N. Y.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MILLERS Falls Co., New York, N. Y. "Barber."

PECK, Stow & Wilcox Co., Southington, Conn.

STANLEY Rule & Level Co., New Britain, Conn.

TURNER & Deegan, Bristol, Conn. "American," "Barbers."

BRASS

BRAZING BRASS

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

HAYMAN & Co., Michael, Buffalo, N. Y.

NORTH American Smelting Co., Philadelphia, Pa. "Vulcan."

RIVERSIDE Metal Co., Riverside, N. J.

SEYMOUR Mfg. Co., Seymour, Conn.

VULCAN—See North American Smelting Co.

BRUSHES

FOUNDRY AND SHOP BRUSHES

BRAND Co., S. H., Chicago, Ill.

BROMWELL Brush & Wire Goods Co., Cincinnati, O.

CINCINNATI Mfg. Co., Cincinnati, O.

FLINT, Warren F., Boston, Mass.

INDIANAPOLIS Brush & Broom Mfg. Co., Indianapolis, Ind.

MASON Brush Works, Worcester, Mass.

OSBORN Co., J. M. & L. A., Cleveland, Ohio.

SMITH Foundry Supply Co., J. D., Cleveland, O.

PAINT AND VARNISH BRUSHES

BOAR'S HEAD—See Fisher-Mitchell Co.

BRADLEY & Smith, New York, N. Y.

BURTON & Co., A. E., Boston, Mass.

CLINTON & Co., E., Philadelphia, Pa.

DEVOE & C. T. Raynolds Co., F. W., New York, N. Y.

FISHER-MITCHELL Co., New York, N. Y. "Boar's Head."

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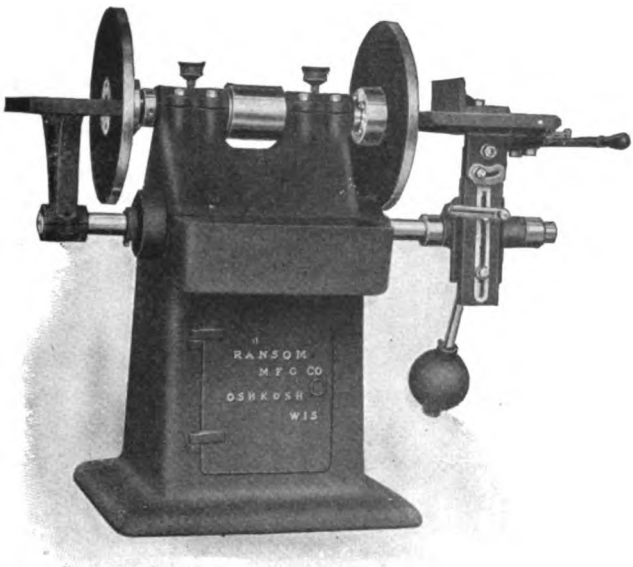
DISC GRINDERS



to operate discs 18, 20, 23 and 27″ dia. for

Automobile Work

Grinding Experts

Ransom Mfg. Co.

Oshkosh, Wis. U. S. A.

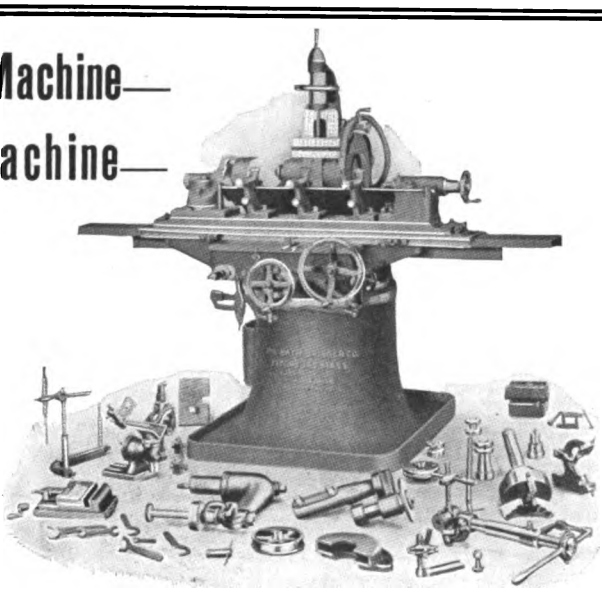
A Commercial Machine—

A One-Place Machine—

The Bath

Universal Grinder

is the machine for the tool room, for all kinds of grinding—of greater and almost unlimited range. It is a Plain, Surface, Disc, Internal and Cutter Grinder all in one. All make-shift grinding is done away with — the Bath is *designed* to handle everything. This is the machine you want to know about.



THE BATH GRINDER CO., Inc., Fitchburg, Mass., U. S. A.

Japan, Albert Herbert, 14 Yamashitacho, Yokohama. Northern and Eastern Germany and Austria-Hungary, Sweden and Russia, Schuchardt and Schute, Berlin. Western and Southern Germany, Switzerland, Holland, Belgium, France, Spain and Italy, Alfred H. Schutte, Neumarkt 18, Cologne. Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow.

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BRUSHES (Continued)

PAINT AND VARNISH BRUSHES (Continued)

FRENCH & Co., Samuel H., Philadelphia, Pa.
GERTS, Lumbard & Co., Chicago, Ill.
HANLON & Goodman Co., New York, N. Y.
LUCAS & Co., John, Philadelphia, Pa.
MILES Bros. & Co., New York, N. Y.
OSBORN Co., J. M. & L. A., Cleveland, Ohio.
PACKARD Co., A., Boston, Mass.
PICKERING Mfg. Co., Philadelphia, Pa.
RODRIGUEZ, R. E., New York, N. Y.
RUBBERSET Co., Newark, N. J.
THAYER & Co., P. E., Pawtucket, R. I.
THUM, Chas. D., Philadelphia, Pa.
UNITED Brush Manufactories, New York, N. Y.
WASHBURN Co., Ira D., Cincinnati, O.
WHITING-J. J. Adams Co., John L., Boston, Mass.

VARNISH BRUSHES

(See Brushes, Paint and Varnish)

BULLDOZERS

AJAX Mfg. Co., Cleveland, O.
BLISS Co., E. W., Brooklyn, N. Y.
LONG & Allstatter Co., Hamilton, O.
NILES-BEMENT-POND Co., New York, N. Y.
ROCK River Machine Co., Janesville, Wis.
WILLIAMS, White & Co., Moline, Ill.

CALIPERS

CALIPERS AND DIVIDERS

(For Micrometer Calipers—See Micrometers)

ATHOL Machine Co., Athol, Mass.
BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)
BROWN & Sharpe Mfg. Co., Providence, R. I.
COPELANDS—See Eagan, Thos. F.
EAGAN, Thos. F., Worcester, Mass. "Copelands."
FAY—See Strrett Co.
GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)
JOHNSON, Wm., Newark, N. J.
KRAEUTER & Co., Newark, N. J.
LOWENTRAUT Mfg. Co., P., Newark, N. J.
PECK, Stow & Wilcox Co., Southington, Conn.
SAWYER Tool Mfg. Co., Fitchburg, Mass.
SMITH Co., E. G., Columbia, Pa.
STARRETT Co., L. S., Athol, Mass. "Fay," "Yankee."
YANKEE—See Starrett Co.

CANS

GASOLINE CANS

(For Garage Use)

BEMAN Automatic Oil Can Co., Meadville, Pa.
BROWN Stamping Co., Toledo, O.
CENTRAL Stamping Co., New York, N. Y.
DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 197.)
IRON Clad Mfg. Co., Brooklyn, N. Y.
SEXTON Can Co., Boston, Mass.
WALLMAN Mfg. Co., Milwaukee, Wis.

CASES

BOLT AND SCREW CASES

AMERICAN Bolt & Screw Co., Dayton, O.

CHAPLETS

FOUNDRY CHAPLETS

BURDICK & Son, Albany, N. Y.
CLEVELAND Chaplet & Mfg. Co., Cleveland, O.
GEM Mfg. Co., Pittsburg, Pa.
HASKINS—See Hill & Griffith Co.
HILL & Griffith Co., Cincinnati, O. "Peerless." "Haskins." (See page 479.)
LINDSAY & Co., W. W., Philadelphia, Pa.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)
PEERLESS—See Hill & Griffith Co.
PHILADELPHIA Chaplet & Mfg. Co., Philadelphia, Pa.
SHANAFELT Mfg. Co., Canton, O.
UNITED States Chaplet & Supply Co., New York, N. Y.

CHISELS

CAPE CHISELS

(See Chisels, Cold and Cape)

COLD AND CAPE CHISELS

AKRON Machine Co., Akron, O.
ATHA Tool Co., Newark, N. J.
BEALL Bros., Alton, Ill.
BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)
BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

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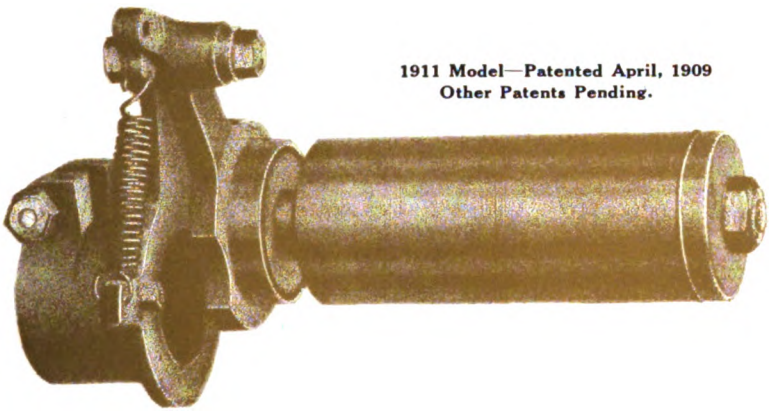
American Whistle



1911 Model—Patented April, 1909
Other Patents Pending.

FOR MOTOR CARS AND MOTOR BOATS

AN IDEAL
Alarm Whistle

Not a cheap whistle, but inexpensive to attach to any car and costs nothing to keep up. Simply clamps on end of exhaust pipe, rear end of muffler, and will not **clog** up with carbon, mud or dirt; always blows itself clean.

Has a pleasant tone, can be made to give a low tone or loud tone, which can be heard a mile off according to pressure on foot pedal, which throws whistle partially or wholly over the exhaust.

Produces No Back Pressure.

PRICE $8.00 EACH

AMERICAN WHISTLE CO.

16 Wakefield Ave., Buffalo, N. Y.

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AMERICAN RIM CO.

NOW CONTROLLING THE

LAMBERT RIMS

DEMOUNTABLE QUICK-DETACHABLE

The Demountable-Quick-Detachable rim which will become the standard for all countries must be that one which, considered from all points, is the BEST. We present to you here, on one hand, indisputable advantages of our Lambert Type, and on the other some of the disadvantages that it has eliminated.

OUR ADVANTAGES	ELIMINATES
Absolute Safety	Doubtful Safety.
Positive operation, on and *off*	Uncertainty of application.
Cannot rust on	Hammering off.
Neat appearance	Cumbersome projections.
One removable, operating bolt	Nuts and wedges to remove and lose.
Lightest made	Unnecessary weight.
Automatically adjusted	Careful individual adjustments.
Understood at a glance	Freak or "Scientific" construction.
Fastest in the world	Unexpected delays.
Complete operation of removing rim from wheel and tire from rim can be made in 15 seconds.	*"Time is Money."*
Reasonable in price	Expensive construction.

It has been absolutely proven in actual service that the Lambert Rim has the above points of superiority.

If your dealer cannot supply you write direct to us.

American Rim Co., 248 West 54th Street New York City

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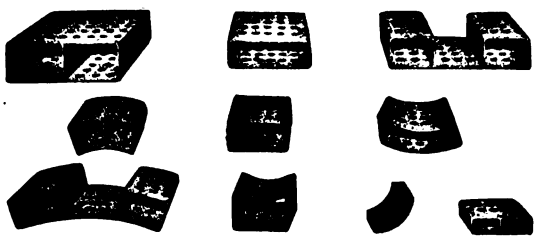
VANADIUM STEELS

We manufacture all types. Absolutely uniform in quality. In all sizes—annealed and unannealed.

Vulcan Crucible Steel Company

General Office and Works - - Main Street, ALIQUIPPA, PA.

The Peerless Perforated Chaplet



Haskin's Patents, October 9, 1900; September 23, 1902; October 9, 1909.

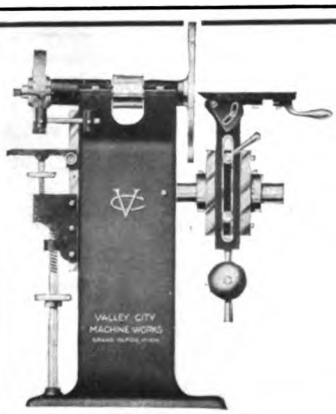
Particularly adapted for automobile or any other gas or gasoline engines.

This chaplet, made from perforated tin-plated sheet metal, which insures perfect ventilation of the chaplet, eliminates blow-holes, air pockets, chills, etc., forming a perfect union with the molten metal, thereby insuring an absolute pressure-tight joint; something not obtained with any other chaplet.

The Hill & Griffith Company

Sole Manufacturers

Cincinnati, O. Birmingham, Ala.



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Grinding and Polishing Machinery

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CASTING INGOT COPPER
CABBAGED COPPER
STRAITS TIN
BAR TIN
SPELTER
RED INGOT BRASS
YELLOW INGOT BRASS

BRONZE COMPOSITIONS
PIG LEAD
ANTIMONY
BABBITT (all kinds)
SOLDER (all kinds)
ALUMINUM
STICK PHOSPHORUS
PHOSPHOR TIN
PHOSPHOR COPPER

SILICON
SILICON COMPOSITIONS
MANGANESE
MANGANESE COMPOSITIONS
BISMUTH
NICKEL
MERCURY
CRUCIBLES

ALSO BUY AND SELL SCRAP METALS OF ALL KINDS.

Agents for GLOBE METAL CO.'S INGOT BRASS Manufactured According to Specifications

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CHISELS (Continued)

COLD AND CAPE CHISELS (Continued)

BREWER Bros. Co., Philadelphia, Pa.

BUCK Bros., Milbury, Mass.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N .Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y. (See page 539.)

DIAMOND—See Whitman & Barnes Mfg. Co.

DREW & Co., C., Kingston, Mass.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

HALL Co., Chas. E., Buffalo, N. Y.

HUBBARD & Co., Pittsburg, Pa.

JOHNSON, Wm., Newark, N. J.

KILBORN & Bishop Co., New Haven, Conn.

KLEIN-LOGAN Co., Pittsburg, Pa.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo. (See page 481.)

NOONAN Tool & Machine Co., A. S., Rome, N. Y.

OHIO Tool Co., Columbus, O.

PECK, Stow & Wilcox Co., Southington, Conn.

S. & I. Co., Springfield, Mass.

SCHUTTE & Co., E. G., Cincinnati, O.

SMITH & Co., H. D., Plantsville, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VERONA Tool Works, Pittsburgh, Pa.

VLCHEK Tool Co., Cleveland, O. (See page 481.)

WHITMAN & Barnes Mfg. Co., Akron, Ohio. "Diamond."

WOODWORKERS CHISELS AND GOUGES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUCK Bros., Milbury, Mass.

GREENLEE Bros. & Co., Rockford, Ill.

JENNINGS & Co., C. E., New York, N. Y.

MACK & CO., Rochester, N. Y.

OHIO Tool Co., Columbus, O.

PECK Stow & Wilcox Co., Southington, Conn.

SWAN Co., Jas., Seymour, Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

WINSTED Edge Tool Works, Winsted, Conn.

CHUCKS

BORING MILL CHUCKS

GISHOLT Machine Co., Madison, Wis.

HORTON & Son Co., E., Windsor Locks, Conn.

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

DRILL CHUCKS

ADJUSTABLE Collet Co., Cleveland, O.

ALMOND Mfg. Co., T. R., 1 Maple St., Ashburnham, Mass. (See page 539.)

AMERICAN Specialty Co., Chicago, Ill.

BROWN & Co., R. H., New Haven, Conn. "Reid."

COIT—See Standard Machinery Co.

CUSHMAN Chuck Co., Hartford, Conn. (See page 481.)

DEFIANCE Screw Machine Products Co., Defiance, O.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. "Graham" (See page 493.)

GOODELL Mfg. Co., Greenfield, Mass.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

GRAHAM—See Detroit Twist Drill Co.

GRONKVIST Drill Chuck Co., Jersey City, N. J.

HORTON & Son Co., E., Windsor Locks, Conn.

JACOBS Mfg. Co., Hartford, Conn.

LITTLE GIANT—See Westcott Chuck Co.

McCROSKY Reamer Co., Meadville, Pa. "Wizard."

MILLER'S Falls Co., New York, N. Y.

MORROW Mfg. Co., Elmira, N. Y.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NATIONAL—See Oneida National Chuck Co.

ONEIDA—See Westcott Chuck Co.

ONEIDA National Chuck Co., Oneida, N. Y "National."

PRATT Chuck Co., Frankfort, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

PRESTO—See Whitney Mfg. Co.

REID—See Brown & Co.

RUSSELL Anti-Friction Drill Chuck Co., Elmira, N. Y.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

SKINNER Chuck Co., New Britain, Conn.

STANDARD Machinery Co., Mystic, Conn "Coit."

STANDARD Tool Co., Cleveland, O.

TRUMP Bros. Machine Co., Wilmington, Del.

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y. "Little Giant," "Oneida."

Complete Index to Classification appears on Pages 8 to 22.

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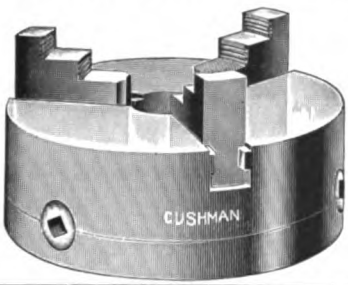
CUSHMAN CHUCKS



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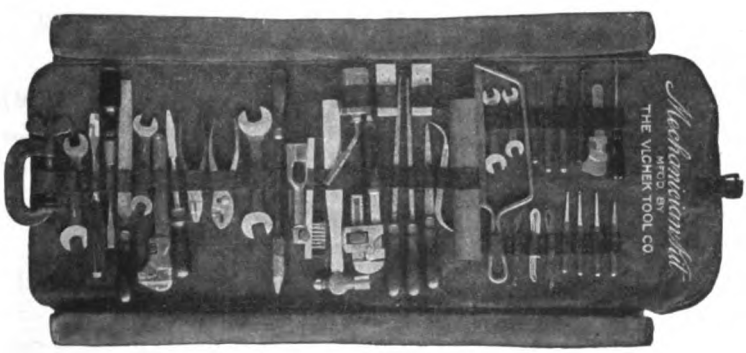
TOOL KITS



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CHUCKS (Continued)

DRILL CHUCKS (Continued)

WHITNEY Mfg. Co., Hartford, Conn. "Presto."
(See page 705.)

WHITON Machine Co., D. E., New London, Conn.
(See page 555.)

WIZARD—See McCrosky Reamer Co.

WOODSTOCK Safety Chuck Co., Woodstock, Ill.

LATHE CHUCKS

CUSHMAN Chuck Co., Hartford, Conn.
(See page 481.)

HOGGSON & Pettis Mfg. Co., New Haven, Conn. "Sweetland."

HORTON Machine Co., S. E., Windsor Locks, Conn.

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.)
(See page 529.)

SKINNER Chuck Co., New Britain, Conn.

SWEETLAND—See Hoggson & Pettis Mfg. Co.

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

WHITON Machine Co., D. E., New London, Conn.
(See page 555.)

MAGNETIC CHUCKS

WALKER & Co., O. S., Worcester, Mass.

MILLING MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

SKINNER Chuck Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

PLANER CHUCKS

BARTLETT, E. E., 320 A St., Boston, Mass.
(See page 539.)

JORDAN—See Oneida National Chuck Co.

JORDAN—See Reed Co.

ONEIDA National Chuck Co., Oneida, N. Y. "Jordan."

REED Co., Francis, Worcester, Mass. "Jordan."
(See page 513.)

SKINNER Chuck Co., New Britain, Conn.

UNION Mfg. Co., New Britain, Conn.

PNEUMATIC CHUCKS

AEROCHUCK—See Manufacturers Equipment Co.

MANUFACTURERS Equipment Co., Chicago, Ill. "Aerochuck."

SCREW MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

CLAMPS

MACHINISTS CLAMPS

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BROWN & Sharpe Mfg. Co., Providence R. I.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

HARGRAVES—See Cincinnati Tool Co.

HOWELL & Murray, Waverly, N. Y.
(See page 512.)

IDEAL Machine Works, Brooklyn, N. Y.

LE COUNT, Wm. G., S. Norwalk, Conn

MARK Mfg. Co., Chicago, Ill.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PHOENIX Hardware Mfg. Co., Homer, N. Y

SAWYER Tool Mfg. Co., Fitchburg, Mass

STARRETT Co., L. S., Athol, Mass.

TAYLOR Mfg. Co., James L., Bloomfield, N. J.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.
(See page 499.)

WOODWORKERS CLAMPS

ALDRICH Co., Wm. K., Lowell, Mass.

BATAVIA Clamp Co., 131 Center St., Batavia, N. Y. "Colts."
(See page 213.)

BLISS Mfg. Co., R., Pawtucket, R. I.

BUFFALO—See Josef Mfg. Co.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

COLTS—See Batavia Clamp Co.

DANN Bros. & Co., New Haven, Conn.

DAYTON Malleable Iron Co., Dayton, O.

DETROIT Screw Works, Detroit, Mich. "Reno."
(See page 739.)

EAGLE—See Woodruff & Sons Co.

EBERHARD Mfg. Co., Cleveland, O.

ERIE Stamping & Mfg. Co., Erie, Pa. "Thompson."

GRAND Rapids Hand Screw Co., Grand Rapids, Mich.

HARGRAVES—See Cincinnati Tool Co.

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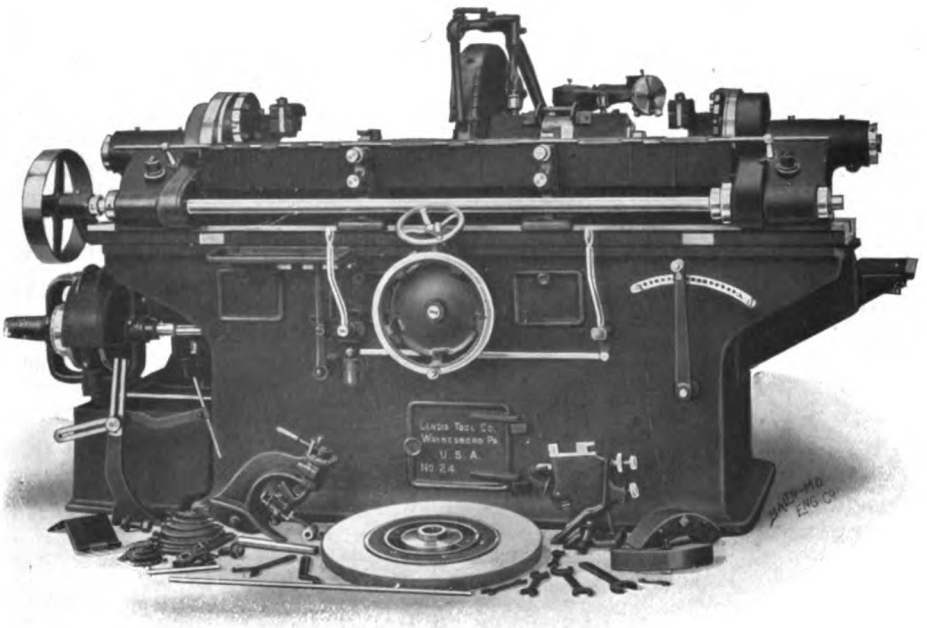
The Indispensable Tool for the Automobile Manufacturer



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for grinding crankshafts. The Landis Grinder first of all insures accuracy; it makes like parts absolutely interchangeable and the work is done rapidly, more so than it can be done in any other way; in fact there is no other way in which accuracy can be gained as by the Landis Way, and any Automobile Manufacturer who hopes to come within time limits on his output must use the Landis Grinder.

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CLAMPS (Continued)

WOODWORKERS CLAMPS (Continued)

JOSEF Mfg. Co., E. E., Buffalo, N. Y. "Buffalo."

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill.

MT. CARMEL—See Woodruff & Sons Co.

NATIONAL Novelty Corp., New York, N. Y.

OHIO Tool Co., Columbus, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PECK, Stow & Wilcox Co., Southington, Conn.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

RENO—See Detroit Screw Works.

SANDUSKY Tool Co., Sandusky, O.

SHELDON & Co., E. H., Chicago, Ill.

TAYLOR Mfg. Co., James L., Bloomfield, N. J.

THOMPSON—See Erie Stamping & Mfg. Co.

WOODRUFF & Sons Co., Walter W., Mt. Carmel, Conn. "Eagle," "Mt. Carmel."

CLIPPERS

BOLT AND RIVET CLIPPERS

(Hand Power)

ALLEN-RANDALL—See Porter, H. K.

CHAMBERS Bros. Co., Philadelphia, Pa.

COLUMBUS Bolt Works, Columbus, O.

EASY—See Porter, H. K.

ELM CITY—See Schollhorn Co.

HELWIG Mfg. Co., St. Paul, Minn.

METAL Stamping Co., Long Island City, N. Y.

NEW EASY—See Porter, H. K.

PECK, Stow & Wilcox Co., Southington, Conn.

PORTER, H. K., Everett, Mass. "Easy," "New Easy," "Allen-Randall." (See page 485.)

ROBERTS Mfg. Co., Park & Beacon Sts., Somerville, Mass. "Victor." (See page 485.)

SCHOLLHORN Co., Wm., New Haven, Conn. "Elm City."

VICTOR—See Roberts Mfg. Co.

RIVET CLIPPERS

(See Clippers, Bolt and Rivet)

COLLECTORS

DUST EXHAUST AND COLLECTOR SYSTEMS

AMERICAN Blower Co., Detroit, Mich.

BUFFALO Forge Co., Buffalo, N. Y.

KNICKERBOCKER Co., Jackson, Mich. "Morse-Rarefied."

MORSE-RAREFIED—See Knickerbocker Co.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

COMPOUNDS

BRAZING COMPOUNDS

A. & J. Mfg. Co., Chicago, Ill.

BANNER—See Cortland Specialty Co.

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

CLEVELAND Block Co., Cleveland, O.

CORTLAND Specialty Co., Cortland, N. Y. "Banner."

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 217.)

FLUXINE—See Krembs & Co.

KAST-I-ON—See Taber, A. T.

KREMBS & Co., Chicago, Ill. "Fluxine."

PHILLIPS-LAFITTE Co., Philadelphia, Pa.

SCHNEIDER, Emil, Newark, N. J.

STANDARD Brazing Co., Boston, Mass. "Tichon."

STANDARD Mfg. Co., Chicago, Ill. "Superior."

SUPERIOR—See Standard Mfg. Co.

TABER, A. T., Corona, Cal. "Kast-I-On."

TICHON—See Standard Brazing Co.

UNIVERSAL Fluxine Co., Urbana, O.

BUFFING AND POLISHING COMPOUNDS

AUBURN Soap & Chemical Co., Auburn, N. Y. "Crown," "Ebonite."

BENNETT-O'CONNELL Co., Chicago, Ill. "Mascot."

CROWN—See Auburn Soap & Chemical Co.

DETROIT Foundry Supply Co., Detroit, Mich.

DIXON, William, 39 John St., New York, N. Y. (See page 485.)

EBONITE—See Auburn Soap & Chemical Co.

LYMAN Co., John R., Springfield, Mass.

MASCOT—See Bennett-O'Connell Co.

MATCHLESS Metal Polish Co., New York, N. Y. "White-Diamond."

ORIENTAL Rouge Co., Bridgeport, Conn.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. "White Rose," "White Columbia." (See pages 547 and 548.)

WHITE COLUMBIA—See Stevens, Frederic B.

WHITE-DIAMOND—See Matchless Metal Polish Co.

WHITE ROSE—See Stevens, Frederic B.

CASE HARDENING COMPOUNDS

ALTEMUS, W. F., Hartford, Conn.

BLACK DIAMOND—See Rogers & Hubbard Co.

BLAICH, Alfred O., 934-38 Pratt St., Chicago, Ill. (See page 503.)

HOUGHTON & Co., E. F., Philadelphia, Pa.

HOWARD & Co., Louis A., Chicago, Ill.

MOSSO, C. A., Chicago, Ill.

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COMPOUNDS (Continued)

CASE HARDENING COMPOUNDS (Continued)

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RODMAN Chemical Co., Pittsburg, Pa.

ROGERS & Hubbard Co., Middletown, Conn. "Black Diamond."

V. D.—See Van Doren Mfg. Co.

VAN Doren Mfg. Co., Chicago Heights, Ill. "V. D."

CORE COMPOUNDS

DETROIT Foundry Supply Co., Detroit, Mich. "Eureka."

EBONY—See Hill & Griffith Co.

EUREKA—See Detroit Foundry Supply Co.

GLUTRIN—See Robeson Process Co.

HILL & Griffith Co., Cincinnati, O. "Ebony." "Linoline." (See page 479.)

HOLLAND Linseed Oil Co., Chicago, Ill.

KING KORE KOMPOUND—See Stevens, Frederic B.

LINOLINE—See Hill & Griffith Co.

MILLS Mfg. Co., H. E., Syracuse, N. Y.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

ROBESON Process Co., Au Sable Forks, N. Y. "Glutrin."

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. "King Kore Kompound." (See pages 547 and 548.)

POLISHING COMPOUNDS

(See Compounds, Buffing and Polishing)

WELDING COMPOUNDS

CORTLAND Welding Compound Co., Cortland, N. Y.

DINGEE, Mont. H., Lynchburg, Va. "Sparger's."

KREMBS & Co., Chicago, Ill. "Weldine."

SPARGER'S—See Dingee, Mont. H.

WELDINE—See Krembs & Co.

COUNTERBORES

AMERICAN Die & Tool Co., Reading, Pa.

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

KENDRICK & Davis Co., Lebanon, N. H.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

REECE Co E. F., Greenfield, Mass.

COUNTERSINKS

AMERICAN Die & Tool Co., Reading, Pa.

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

CELFOR Tool Co., Chicago, Ill.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

CLEVELAND Twist Drill Co., Cleveland, O

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 493.)

DEUSE, J. S., Chester, Conn.

DIAMOND—See Whitman & Barnes Mfg. Co.

HARGRAVES—See Cincinnati Tool Co.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

JOHNSON, Wm., Newark, N. J.

KENDRICK & Davis Co., Lebanon, N. H.

KILBORN & Bishop Co., New Haven, Conn

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

LOWENTRAUT Mfg. Co., P., Newark, N. J

MAYHEW Co., H. H., Shelburne Falls, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

REECE Co., E. F., Greenfield, Mass.

SNELL Mfg. Co., Fishdale, Mass.

STANDARD Tool Co., Cleveland, Ohio.

STARRETT Co., L. S., Athol, Mass.

SWAN Co., Jas., Seymour, Conn.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK, Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

WHITMAN & Barnes Mfg. Co., Akron, Ohio "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass "Lightning."

CRANES

PORTABLE CRANES, HOISTS AND CHAIN BLOCKS

ACME—See Moore Co.

BURR Mfg. Co., Cleveland, O.

CAMERON Engineering Co., Brooklyn, N. Y.

CANTON Foundry & Machine Co., Canton, O.

CHISHOLM & Moore Mfg. Co., Cleveland, O. "Cyclone."

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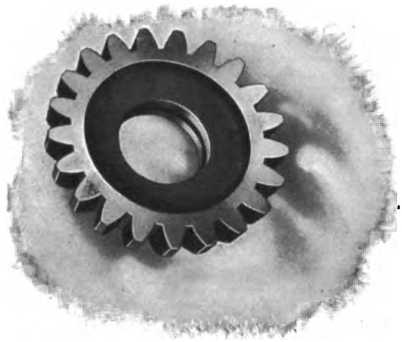

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Plane Your Gears by the Gear Shaper System

which uses a ground generating cutter. In addition to cutting faster and turning out smoother gears than any other machine, it planes cluster and internal gears from the solid blank. A very large per cent of all automobile gears are cut on the Gear Shaper.

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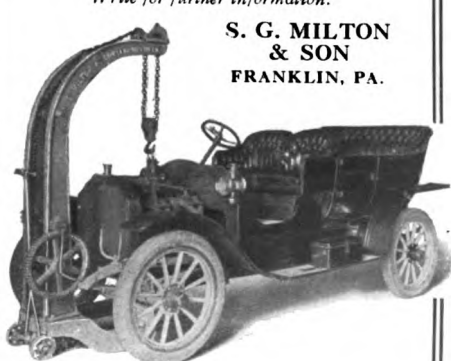
FRANKLIN, PA.



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CRANES (Continued)

PORTABLE CRANES, HOISTS AND CHAIN BLOCKS (Continued)

CYCLONE—See Chisholm & Moore Mfg. Co.

DOBBIE Foundry & Machine Co., Niagara Falls, N. Y.

FORD Chain Block Co., Philadelphia, Pa. "Tribloc."

FRANKLIN Portable Crane & Hoist Co., Franklin, Pa.

HARRINGTON, Son & Co., Edwin, Philadelphia, Pa. "Peerless."

HERCULES—See Nicholls, Wm. S.

MILTON & Son, S. G., Franklin, Pa. (See page 487.)

MOORE Co., Franklin, Winsted, Conn. "Acme."

NICHOLLS, Wm. S., New York, N. Y. "Hercules."

NILES-BEMENT-POND Co., New York. N. Y.

PEERLESS—See Harrington, Son & Co.

ROUND & Son, D., Cleveland, O.

TRIBLOC—See Ford Chain Block Co.

UNION Elevator & Machine Co., 215-17 W. Ontario, St., Chicago, Ill. (See page 499.)

YALE & Towne Mfg. Co., 9 Murray St., New York, N. Y. (See page 267.)

CRUCIBLES

METAL MELTING CRUCIBLES

BARTLEY Crucible Co., Jonathan, Trenton, N. J.

BRIDGEPORT Crucible Co., Bridgeport, Conn.

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 217.)

GAUTIER & Co., J. H., Jersey City, N. J.

McCULLOUGH-DALZELL Crucible Co., Pittsburg, Pa.

PAIGE Retort & Crucible Co., Taunton, Mass.

ROSS-TACONY Crucible Co., Philadelphia. Pa.

SEIDEL, B. B., Philadelphia, Pa.

TAUNTON Crucible Co., Taunton, Mass.

TAYLOR, Robert J., Philadelphia, Pa.

CUPOLAS

FOUNDRY CUPOLAS

BYRAM & Co., Detroit, Mich.

CALUMET Engineering Works, Harvey, Ill.

DETROIT Foundry Supply Co., Detroit, Mich.

McCORMICK Co., J. S., Pittsburg, Pa.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NEWTEN—See Northern Engineering Works.

NORTHERN Engineering Works, Detroit, Mich. "Newten."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

WHITING Foundry Equipment Co. Harvey. Ill.

CUTTERS

BAR CUTTERS

(See Cutters, Rod and Bar)

GASKET CUTTERS

(See Cutters, Washers and Gasket)

LEATHER FILLET CUTTERS

MILWAUKEE Foundry Supply Co., Milwaukee, Wis.

MILLING CUTTERS

AMERICAN Die & Tool Co., Reading, Pa.

BARBER-COLMAN Co., Rockford, Ill.

BECKER Milling Machine Co., Hyde Park, Mass. (See page 531.)

BOKER & Co., Herman, New York, N. Y. (Importers.)

BROWN & Sharpe Mfg. Co., Providence. R. I.

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 493.)

GEOMETRIC Tool Co., New Haven, Conn.

HARRISON & Knight Mfg. Co., Newark, N. J.

HUTHER Saw Works, Rochester, N. Y. (See page 555.)

INGERSOLL Milling Machine Co., Rockford, Ill.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NATIONAL Tool Co., Cleveland, O.

NATIONAL Twist Drill & Tool Co., Detroit Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ROGERS Works, John M., Gloucester City, N. J.

STANDARD Tool Co., Cleveland, O.

UNION Twist Drill Co., Athol, Mass.

UNIVERSAL Boring Machine Co., Hudson, Mass.

WHITNEY Mfg. Co., Hartford, Conn. (See page 705.)

Complete Index to Classification appears on Pages 8 to 22.

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CRANK SHAFTS

Forged, rough machined, or finished from O. H., nickel and Vanadium steels.

Die blocks and bars

Ordinary and alloy steel castings. (Deemer process.)

A. P. WITTEMAN COMPANY

(Works, Chester, Pa.) **112-116 N. BROAD ST., PHILADELPHIA**

WESTERN DROP FORGE CO.

Manufacturers of

Automobile Drop Forgings

Steel Tanks and Sheet Iron Work of Every Description.

Largely increased facilities enable us to insure prompt deliveries.
Send us blue prints and let us figure on your requirements

WESTERN DROP FORGE CO., MARION, IND.

WE GUARANTEE QUALITY

Our factory is devoted exclusively to the manufacture of **Motor Car Axles, Jack Shafts and Differential Gears.**

Prompt Delivery—Right Prices

RUSSEL MOTOR AXLE COMPANY

NORTH DETROIT, MICHIGAN

SOLID CAM SHAFTS

Better than ANY built-up cam shaft.
Cost less than a GOOD built-up shaft.
Once right, always right—no cams to work loose.
OURS ARE RIGHT—cams thoroughly hardened and shaft mechanically perfect.

MUSKEGON MOTOR SPECIALTIES CO., Water St., MUSKEGON, MICH.

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CUTTERS (Continued)

PIPE CUTTERS

(Hand Power)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

AYES & Co., Chicago, Ill. "Barnes," "Saunders."

BARNES—See Ayes & Co.

BARNES—See Collmer Bros.

BARNES Tool Co., New Haven, Conn.

COLLMER Bros., South Bend, Ind. "Barnes." "Saunders."

ERIE Tool Works, Erie, Pa.

HOLLANDS Mfg. Co., Erie, Pa.

MARK Mfg. Co., Chicago, Ill.

OSWEGO Tool Co., Oswego, N. Y.

REED Mfg. Co., Erie, Pa.

SAUNDERS—See Ayes & Co.

SAUNDERS—See Collmer Bros.

SAUNDERS Sons, D., Yonkers, N. Y.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo." (See page 573.)

WELLS & Son Co., F. E., Greenfield, Mass.

ROD AND BAR CUTTERS

(Hand Power)

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

BELDEN Machine Co., New Haven, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MARVEL—See Armstrong-Blum Mfg. Co.

MERSICK Co., C. S., New Haven, Conn.

MERWIN Mfg. Co., Erie, Pa. "Vulcan."

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

VULCAN—See Merwin Mfg. Co.

SPRUE CUTTERS

BARNETT Foundry Co., Oscar, Newark, N. J.

BLISS Co., E. W., Brooklyn, N. Y.

BRASS Founders Supply Co., Newark, N. J.

BUFFALO Forge Co., Buffalo, N. Y.

SHUSTER Co., F. B., New Haven, Conn.

STANDARD Machinery Co., Providence, R. I.

TURNER Machine Co., Philadelphia, Pa.

WASHER OR GASKET CUTTERS

BONNEY Vise & Tool Works, Allentown, Pa. "Cooper."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CENTURY—See Mount Tool & Scraper Co.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

COOPER—See Bonney Vise & Tool Co.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

HARGRAVES—See Cincinnati Tool Co.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT, Mfg. Co., P., Newark, N. J.

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo. "Century." (See page 481.)

ROSE, J. A., Hastings, Neb.

SMITH, Otis A., Rockfall, Conn.

STORTZ & Son, John, Philadelphia, Pa.

WOOD FORMING CUTTERS

SHIMER & Sons, Samuel J., Milton, Pa. (See page 487.)

DIES

SCREW CUTTING DIES

(See Taps and Dies)

DIVIDERS

DIVIDERS AND CALIPERS

(See Calipers and Dividers)

DOGS

LATHE DOGS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BESLY & Co., Chas. H., Chicago, Ill. (See page 491.)

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BONNEY Vise & Tool Works, Allentown, Pa.

COLLMER Bros., South Bend, Ind. "Le Count."

HILL Standard Mfg. Co., Anderson, Ind.

LE COUNT, Wm. G., S. Norwalk, Conn.

LE COUNT—See Collmer Bros.

MARK Mfg. Co., Chicago, Ill.

O. K. Tool Holder Co., Shelton, Conn.

OSWEGO Tool Co., Oswego, N. Y.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

WESTERN Tool & Mfg. Co., Springfield, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

MILLING MACHINE DOGS

HILL Mfg. Co., M. B., Worcester, Mass.

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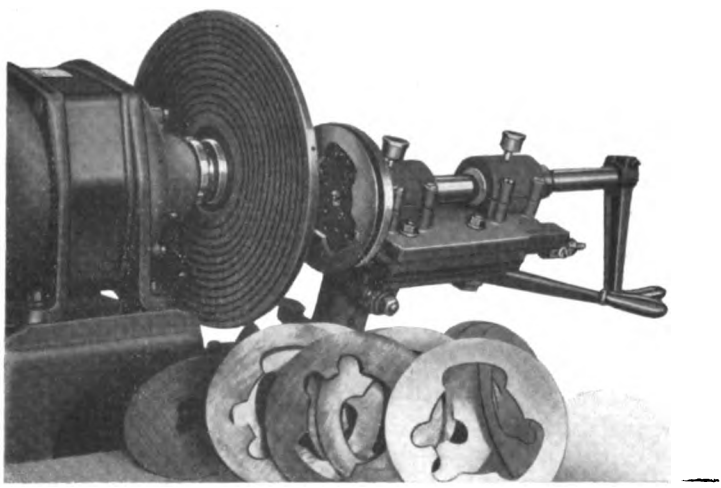
BESLY GRINDER ON AUTOMOBILE PARTS

Fastest Surface Reducer in Existence

One Besly Grinder, with unskilled operator, displaces FOUR SPECIALLY EQUIPPED LATHES and reduces cost EIGHTY PER CENT.



Grinding Bronze Discs for Planetary Transmission, 4¾-inch outside diameter, 3 7-16-inch inside diameter, ⅛ inch thick, finished

Stock removed, about .010 inch on each side.
Accuracy—By exercising a little care these pieces are ground parallel within .0005 inch.
Machine, No. 41-G Besly Grinder, with Besly Rotary Fixture (patented), as shown in illustration. Work is supported on pins set in face plate.
Circle, No. 5360, Grain No. 16. Helmet Spiral Circle.
Time, 60 discs, 120 sides per hour.
Former time on lathe using special fixture, carrying two tools and thereby facing both sides at one time, 15 discs, 30 sides per hour.

Our illustrated booklet, "Besly's Modern Disc Grinding Practice," and our new BESLY GRINDER catalogue, just off the press, thoroughly cover the disc grinder subject. They are mailed free on application and should be in the hands of your Manager, Superintendent and Foreman. Write for them to-day.

CHARLES H. BESLY & COMPANY

(ORIGINATORS OF DISC GRINDERS)

CHICAGO **U. S. A.**

Largest Manufacturers of Disc Grinders in the World

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DOWELS

PATTERN MAKERS DOWELS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Fillet Co., Cleveland, O.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.
(See page 259.)

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 533.)

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WINKLEY Co., Detroit, Mich.
(See page 711.)

DRESSERS

EMERY WHEEL DRESSERS

BAY State Stamping Co., Worcester, Mass. "Bennett."

BENNETT—See Bay State Stamping Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

CALDER, Geo. H., Lancaster, Pa.

CHALLENGE Machine Co., Philadelphia, Pa. "Gruva."

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

COLLMER Bros., South Bend, Ind. "Huntington."

COLUMBUS Bolt Works, Columbus, O.

CROWN—See Clizbe Bros. Mfg. Co.

DESMOND-STEPHAN Mfg. Co., Urbana, O. "Diamo-Carbo," "Sherman," "Huntington."
(See page 501.)

DETROIT Screw Works, Detroit, Mich. "Huntington."
(See page 739.)

DIAMO-CARBO—See Desmond-Stephan Mfg. Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

GRUVA—See Challenge Machine Co.

HUNTINGTON—See Collmer Bros.

HUNTINGTON—See Desmond-Stephan Mfg. Co.

HUNTINGTON—See Detroit Screw Works.

HUNTINGTON—See Mark Mfg. Co.

MARBACH Co., F. G., Medina, O.

MARK Mfg. Co., Chicago, Ill. "Huntington."

OSGOOD, J. L., Buffalo, N. Y.

PENINSULA Emery Wheel Co., Detroit, Mich

REED Mfg. Co., Erie, Pa.

SHERMAN—See Desmond-Stephan Mfg. Co.

STANDARD Tool Co., Cleveland, O.

STERLING—See Diamond Saw & Stamping Works.

WRIGLEY Co., Thomas, Chicago, Ill.

DRILLS

BREAST DRILLS

FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

LANCASTER Machine & Knife Works, Lancaster, N. Y. "McClellan."

McCLELLAN—See Lancaster Machine & Knife Works.

MILLERS Falls Co., New York, N. Y.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee."
(See page 493.)

PECK, Stow & Wilcox Co., Southington, Conn.

TURNER & Deegan, Bristol, Conn.

YANKEE—See North Bros. Mfg. Co.

CENTERING DRILLS

CLEVELAND Twist Drill Co., Cleveland, O.

LORD Co., L. L., Meadville, Pa.

SLOCOMB Co., J. T., Providence, R. I.

MULTIPLE SPINDLE DRILLS

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass.
(See page 497.)

FOOTE-BURT Co., Cleveland, O.

FOX Machine Co., Grand Rapids, Mich.

GARDAM & Sons, Wm., New York, N. Y.

MOLINE Tool Co., Moline, Ill.

NATIONAL Automatic Tool Co., Richmond, Ind.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

PNEUMATIC DRILLS

(See Tools, Pneumatic).

PORTABLE DRILLS AND POLISHERS

ANDERSON Electric Machine Tool Co., St. Louis, Mo.

CARVER—See New York Electric Tool Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill. "Duntley."
(See page 49.)

CINCINNATI Electrical Tool Co., Cincinnati, O. "Peerless."

CLARK, Jr., & Co., James, Louisville, Ky. "Willey."

COATES Clipper Mfg. Co., Worcester, Mass.

DUNTLEY—See Chicago Pneumatic Tool Co.

GEM Mfg. Co., Pittsburg, Pa.

HISEY-WOLF Machine Co., Cincinnati, O.

LAMB Electric Co., Grand Rapids, Mich.

NEW York Electric Tool Co., New York, N. Y. "Carver."

PEERLESS—See Cincinnati Electrical Tool Co.

Complete Index to Classification appears on Pages 8 to 22.

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"YANKEE" BREAST DRILL

Right- and left-hand Ratchet.

Double right-hand Ratchet.

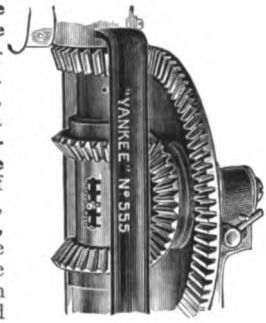
STYLES:

with 2-Jaw Chucks
No. 550 Single Speed
No. 555 Double Speed

with 3-Jaw Chucks
No. 1550 Single Speed
No. 1555 Double Speed

Does more work and works in more ways than any similar tool ever made

¶ Note the little slide on Cylinder between Gears and the notches. With slide in first notch (at top), it is a **Plain Drill,** in second a **Left-Hand Ratchet,** in third a **Right-Hand Ratchet,** in fourth a **Double Ratchet,** where any movement of Crank, forward or backward, causes the Drill to **cut continuously,** a time saver and convenience when working in corners where Crank cannot be turned. In fifth (at bottom) Gearing, etc., is locked to open or close Chuck.



¶ The change of speed, fast or slow, is made by simple movement of lever on hub or Gear and without removing Drill from work, and with any of movements named above.

¶ The 2-jaw Chuck holds accurately and securely both square or round Shanks up to ½ inch inclusive; the 3-jaw Chuck up to ½ inch in diameter.

¶ Adjustable Ball Bearings take all strain or thrust.

¶ The drill is built like a machine.

"YANKEE" TOOLS: Ratchet screwdrivers, regular and special styles; spiral ratchet screwdrivers and attachments, automatic hand or push drills, etc.

Sold by leading dealers of Tools and Hardware

Mechanics should send for our "Yankee" tool book, free. Dealers, for "Yankee" tool catalog.

NORTH BROS. MFG. CO. **Philadelphia, Pa.**

Trade Mark Look for it

"DETROIT" TWIST DRILLS

REAMERS, CUTTERS, SPECIAL TOOLS, ETC.

Trade Mark Look for it

MANUFACTURERS OF AUTOMOBILES, PARTS, ACCESSORIES, ETC., recognize the value of A GOOD DRILL. Operating in the midst of the world's automobile centre, we have learned to know, through personal contact with Factory Managers, Superintendents, Foremen and actual users, just what is required for this special service. The fact that many of the largest Detroit Automobile and Parts factories USE "DETROIT" DRILLS almost exclusively and only after a thorough comparative test with other makes, ought to demonstrate to YOU our ability to serve YOUR INTERESTS equally well. IF YOU WANT A LONG LIVED DRILL, one that CUTS QUICKLY, TRULY and SMOOTHLY through the greatest thickness of metal the greatest number of times **without regrinding,** give "DETROIT" DRILLS a "try-out" at our risk of **Satisfaction or no pay.** Write for **Catalog "B."** State your requirements in a letter, we'll follow with a proposition.

DETROIT TWIST DRILL CO.

657-669 FORT STREET **DETROIT, MICH.**

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DRILLS (Continued)

PORTABLE DRILLS AND POLISHERS (Continued)

STOW Flexible Shaft Co., Philadelphia, Pa

U. S. Electrical Tool Co., Cincinnati, O. (See page 497.)

VAN DORN & Dutton Co., Cleveland, O.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WILLEY—See Clark, Jr., & Co.

POST DRILLS

ADVANCE—See Silver Mfg. Co.

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BAUER Bros. Co., Springfield, O.

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass. (See page 497.)

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

GREEN RIVER—See Wiley & Russell Mfg. Co.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

LITTLE GIANT—See Noyes & Co.

NILES-BEMENT-POND Co., New York, N. Y.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

PECK, Stow & Wilcox Co., Southington, Conn.

SILVER Mfg. Co., Salem, O. "Advance."

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILEY & Russell Mfg. Co.. Greenfield, Mass. "Green River."

RADIAL DRILLS

AMERICAN Tool Works Co., Cincinnati, O.

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass. (See page 497.)

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

GANG Co., Wm. E., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HILBERT Machine Co., Cincinnati, O.

MORRIS Foundry Co., John B., Cincinnati, O.

MUELLER Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

PRENTICE Bros. Co., Worcester, Mass.

SELLERS & Co., Wm., Philadelphia, Pa.

WESTERN Machine Tool Works, Holland, Mich.

RATCHET DRILLS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

ATHA Tool Co., Newark, N. J.

BILLINGS & Spencer Co., Hartford, Conn. "Packer." (See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

DIAMOND—See Whitman & Barnes Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

HUNTER Machine Co., Jas., North Adams, Mass.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Monarch," "Weston." (See page 571.)

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass.

MILLERS Falls Co., New York, N. Y.

MONARCH—See Keystone Mfg. Co.

NUIDEA—See Van Buren Tool Co.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

OSWEGO Tool Co., Oswego, N. Y. "Packer."

PACKER—See Billings & Spencer Co.

PACKER—See Oswego Tool Co.

PANCOAST Co., Henry B., Philadelphia, Pa. "Smith's."

PARKER Co., Chas., Meriden, Conn. (See page 565.)

PECK, Stow & Wilcox Co., Southington Conn.

PRATT & Whitney Co., Hartford, Conn. "Renshaw." (See page 471.)

RENSHAW—See Pratt & Whitney Co.

SMITH'S—See Pancoast & Co.

VAN Buren Tool Co., Van Buren, Ind. "Nuidea."

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

WESTON—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, Ohio. "Diamond."

SENSITIVE DRILLS

AVEY—See Cincinnati Pulley Machinery Co.

BARR, H. G., Worcester, Mass.

BURKE Machinery Co., Conneaut, O.

CINCINNATI Pulley Machinery Co., Cincinnati, O. "Avey."

CORBIN-CHURCH Co., New Britain, Conn.

DWIGHT Slate Machine Co., Hartford, Conn. "Elmore." (See page 511.)

ELMORE—See Dwight Slate Machine Co.

FOOTE-BURT Co., Cleveland, O.

FOX Machine Co., Grand Rapids, Mich.

HAMILTON Machine Tool Co., Hamilton, O.

HENRY & Wright Mfg. Co., Hartford, Conn. (See page 495.)

KNIGHT Machinery Co., W. B., St. Louis, Mo.

Complete Index to Classification appears on Pages 8 to 22.

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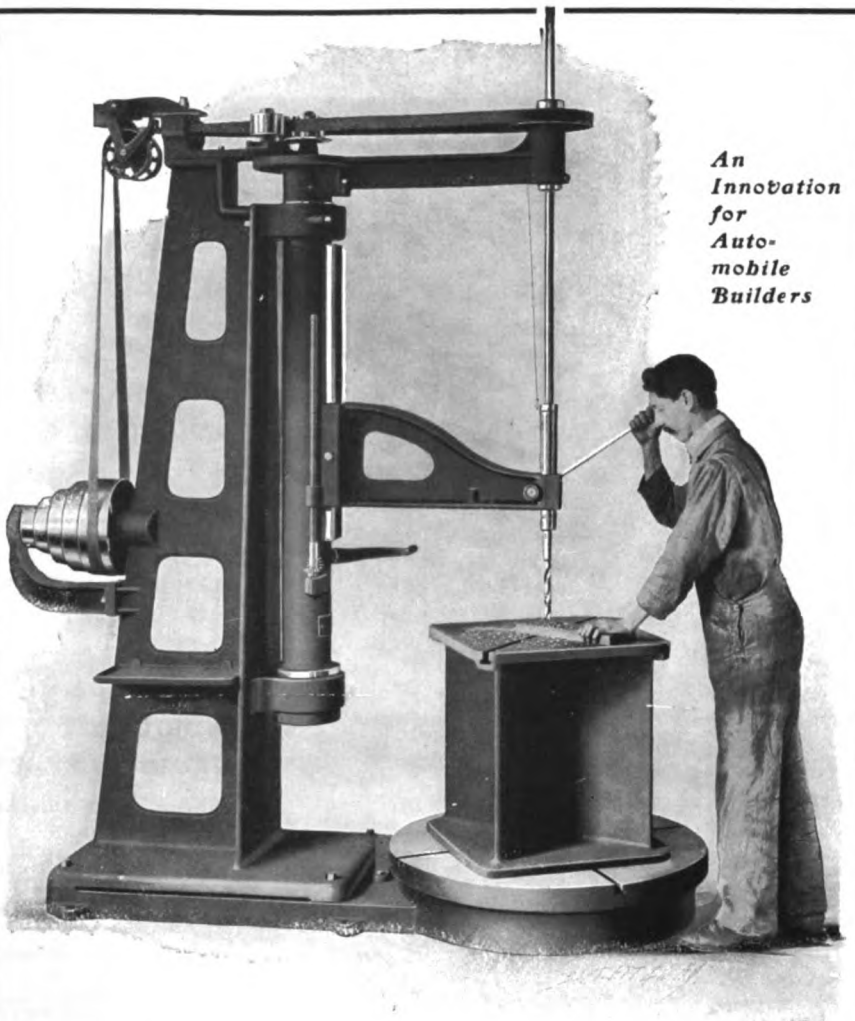

A BALL-BEARING SENSITIVE RADIAL DRILLING MACHINE

This machine offers tremendous advantage to automobile makers and others who have large bulky parts to drill with holes ¾″ in diameter and under.

It can be run with safety at a much higher speed and with much less use of power than any other radial drilling machine.

In working the drills that depend more on speed than feed for their efficiency, it will drill several times as many holes in a given time as others. ¶ CATALOGUE.

THE HENRY & WRIGHT MFG. CO.

HARTFORD, CONN.

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DRILLS (Continued)

SENSITIVE DRILLS (Continued)

LELAND & Co., W. H., Worcester, Mass.

MECHANICS Machine Co., Rockford, Ill.

MIAMI Valley Machine Tool Co., Dayton, O.

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

PRENTICE Bros. Co., Worcester, Mass.

REED Co., Francis, Worcester, Mass. (See page 513.)

ROBERTSON Mfg. Co., Buffalo, N. Y.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

SIGOURNEY Tool Co., Hartford, Conn.

STAPF & Co., John B., Dunkirk, N. Y.

TAYLOR & Fenn Co., Hartford, Conn.

WASHBURN Shops, Worcester, Mass.

TURRET DRILLS

NATIONAL Separator & Machine Co., Boston, Mass.

QUINT, A. D., Hartford, Conn.

TWIST DRILLS

ACME Drill Co., Newark, N. J.

AMERICAN Specialty Co., Chicago, Ill.

CELFOR Tool Co., Chicago, Ill.

CLEVELAND Twist Drill Co., Cleveland, O.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 493.)

DIAMOND—See Whitman & Barnes Mfg. Co.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

NEW Process Twist Drill Co., Taunton, Mass.

NORKA—See Whitman & Barnes Mfg. Co.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

STANDARD Tool Co., Cleveland, O.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

UNION Twist Drill Co., Athol, Mass.

WHITMAN & Barnes Mfg. Co., Akron, Ohio. "Norka," "Diamond."

UPRIGHT DRILLS

AURORA Tool Works, Aurora, Ind.

BAKER Bros., Toledo, O.

BARNES Co., W. F. & John, Rockford, Ill

BARNES Drill Co., Rockford, Ill.

BARR, H. G., Worcester, Mass.

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

CORBIN-CHURCH Co., New Britain, Conn.

DAVIS Machine Co. W. P., Rochester, N. Y.

FRONTIER Iron Works, Buffalo, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HILBERT Machine Co., Cincinnati, O.

HOEFER Mfg. Co., Freeport, Ill.

KERN Machine Tool Co., Cincinnati, O.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

MECHANICS Machine Tool Co., Rockford, Ill.

MOLINE Tool Co., Moline, Ill.

NILES-BEMENT-POND Co., New York, N. Y.

PRENTICE Bros. Co., Worcester, Mass.

REED Co., Francis, Worcester, Mass. (See page 513.)

ROCKFORD Drilling Machine Co., Rockford, Ill.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

SIBLEY Machine Tool Co., So. Bend, Ind.

SNYDER & Son, J. E., Worcester, Mass.

SUPERIOR Machine Tool Co., Kokomo, Ind.

TAYLOR & Fenn Co., Hartford, Conn.

TSCHUDI-McBARRON Machine Co., Dayton, O.

DRIVERS

SCREWDRIVERS

AUTODRIVER—See Bridgeport Hardware Mfg. Corp.

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BISMARK—See Bridgeport Hardware Mfg. Corp.

BLACKSTONE—See Bridgeport Hardware Mfg. Corp.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "New Century."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. "Autodriver," "Gripshank," "Perfecto," "Blackstone," "Challenge," "Warwick," "Bismark," "Lead-All." (See page 499.)

BROWN & Co., R. H., New Haven, Conn. "Clark's."

BUFFUM Tool Co., Louisiana, Mo.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHALLENGE—See Bridgeport Hardware Mfg. Corp.

CHAMPION—See Union Hardware Co.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

CLARK'S—See Brown & Co.

CRONK & Carrier Mfg. Co., Elmira, N. Y. "Elmira," "Star." (See page 539.)

DICKE Tool Co., Downers Grove, Ill.

DISSTON Sons, Henry, Philadelphia, Pa.

ELLIS Co., New Haven, Conn. "Lipscomb."

ELMIRA—See Cronk & Carrier Mfg. Co.

Complete Index to Classification appears on Pages 8 to 23.

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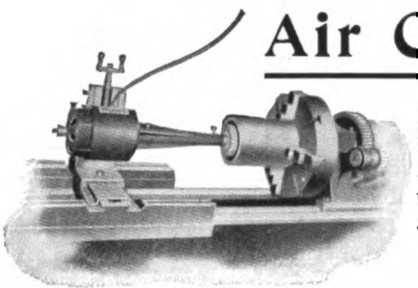
"MORSE" DRILLS

Each process in the making of "MORSE" DRILLS is important in itself, and much depends upon the skill and care used in hardening and tempering. This we have acquired in nearly fifty years of experience. Our facilities for making the *very best* Drills are the *very best*. *A TRIAL IS THE BEST PROOF.*

Morse Twist Drill & Machine Co., New Bedford, Mass., U.S.A.

Air Cooled

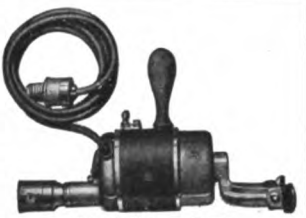


For Grinding Cylinders on a Lathe. Center Grinders and Bench Grinders also.

SENT ON TRIAL

Made for A. C. or D. C 110 and 220 drills in seven sizes up to 1¼".

Send for Catalogue

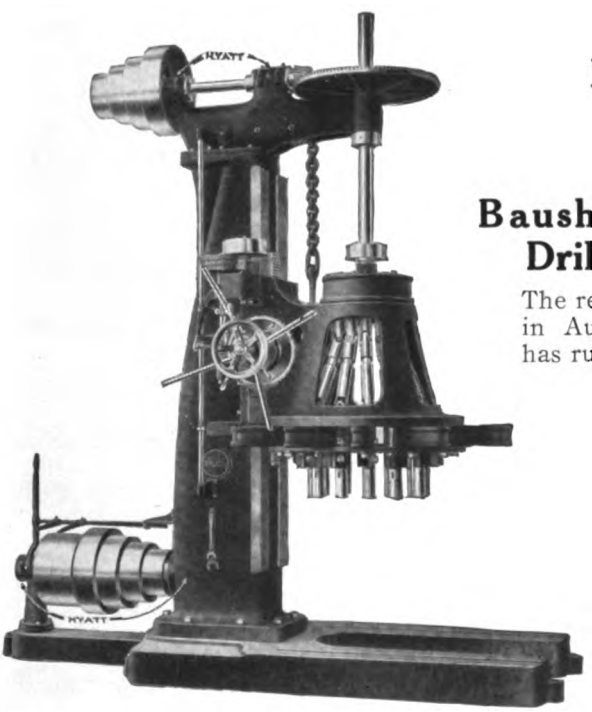


¾ inch Corner Drill

THE

U. S. ELECTRICAL TOOL CO

CINCINNATI, OHIO



ALL RECORDS BROKEN

by

Baush Multi-Spindle Drilling Machines

The record of our machines in Automobile factories, has run as high as

90% OF PAY-ROLL SAVED

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DRIVERS (Continued)

SCREWDRIVERS (Continued)

ELMORE Tool Mfg. Co., Hartford, Conn.

ERIE Stamping & Mfg. Co., Erie, Pa.

GAY, Geo. E., Augusta, Me.

GIANT—See Tuck Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

GRIPSHANK—See Bridgeport Hardware Mfg. Corp.

HALL Co., Chas. E., Buffalo, N. Y.

HARGRAVES—See Cincinnati Tool Co.

HERCULES—See Tuck Mfg. Co.

HERCULES—See Whitman & Barnes Mfg Co.

JOHNSON, Wm., Newark, N. J.

LANES—See McCarty & Co.

LEAD ALL—See Bridgeport Hardware Mfg. Corp.

LIPSCOMB—See Ellis Co.

McCARTY & Co., J. C., 21 Murray St., New York, N. Y. "Lanes." (See page 563.)

MAC-KAE Mfg. Co., 185 Amory St. (Jamaica Plain), Boston, Mass. (See page 631.)

MAYHEW Co., H. H., Shelburne Falls, Mass. "Monarch," "Peerless,"

MONARCH—See Mayhew Co.

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo. (See page 481.)

NEW CENTURY—See Braunsdorf-Mueller Co.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee." (See page 493.)

OHIO Tool Co., Columbus, O.

PECK, Stow & Wilcox Co., Southington, Conn.

PEERLESS—See Mayhew Co.

PERFECT HANDLE—See Smith & Co.

PERFECTO—See Bridgeport Hardware Mfg. Corp.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SENSIBLE—See Vanderbeck Tool Works.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SMITH & Hemmenway Co., New York, N. Y.

STAR—See Cronk & Carrier Mfg. Co.

STAR—See Mayhew Co.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SWAN Co., Jas., Seymour, Conn.

TUCK Mfg. Co., Brockton, Mass. "Hercules," "Giant."

TURNER & Deegan, Bristol, Conn.

UNION Hardware Co., Torrington, Conn. "Champion," "Valley."

VALLEY—See Union Hardware Co.

VANDERBEEK Tool Works, Hartford, Conn. "Sensible."

VLCHEK Tool Co., Cleveland, O. (See page 481.)

WARWICK—See Bridgeport Hardware Mfg. Corp.

WHITMAN & Barnes Mfg. Co., Akron, O. "Hercules."

YANKEE—See North Bros. Mfg. Co.

DRYERS

SAND DRYERS

HORTON Mfg. Co., Painesville, O.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

ELEVATORS

GARAGE ELEVATORS

BRODESSER Elevator Mfg. Co., Milwaukee, Wis.

COHOES Iron Foundry & Machine Co., Cohoes, N. Y.

EATON & Prince Co., Chicago, Ill.

HAUGHTON Elevator & Machine Co., Toledo, O.

KIECKHEFER Elevator Co., A., Milwaukee, Wis.

OTIS Elevator Co., 17 Battery Pl., New York, N. Y. (See page 499.)

REEDY Co., H. J., Cincinnati, O.

REEDY Elevator Co., Hoboken, N. J.

REEDY Elevator Mfg. Co., J. W., Chicago, Ill.

SEDGWICK Machine Works, New York, N. Y.

STORM Mfg. Co., Newark, N. J.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

WARNER Elevator Mfg. Co., Cincinnati, O.

EXPANDERS

BOILER TUBE EXPANDERS

FORG, Peter, Somerville, Mass.

EXTRACTORS

BROKEN TAP EXTRACTORS

WALTON Co., Hartford, Conn.

FACINGS

FOUNDRY FACINGS AND PARTINGS

BRAND Co., S. H., Chicago, Ill.

BROOKLYN Facing Mills, Brooklyn, N. Y.

DETROIT Foundry Supply Co, Detroit, Mich. "Eureka."

DIXON Crucible Co., Jos., Jersey City, N. J. (See page 217.)

DOGGETT, Stanley, New York, N. Y.

EUREKA—See Detroit Foundry Supply Co.

Complete Index to Classification appears on Pages 8 to 22.

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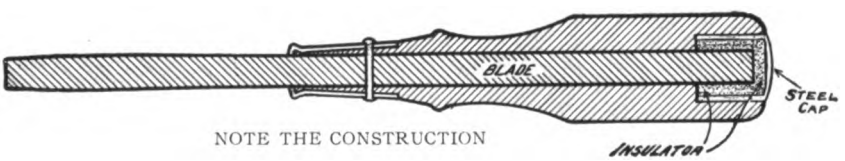

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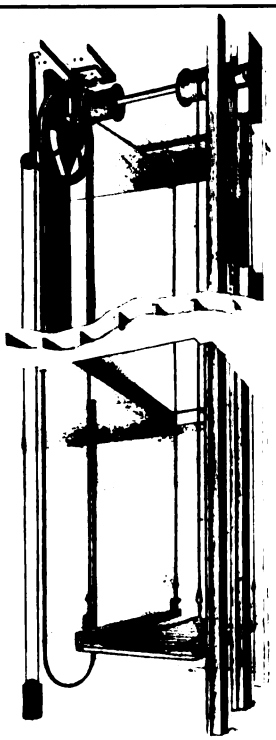

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FACINGS (Continued)

FOUNDRY FACINGS AND PARTINGS (Continued)

FOUNDRY Specialty Co., Cincinnati, O "Partine."

HILL & Griffith Co., Cincinnati, O. (See page 479.)

KELLY & Co., T. P., Hamilton, O.

LYCOPART—See Swoboda, L. J.

McCORMICK Co., J. S., Pittsburg, Pa.

PARTINE—See Foundry Specialty Co.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

PETTINOS Bros., Bethlehem, Pa.

SPRINGFIELD Facing Co., Springfield, Mass.

SMITH Foundry Supply Co., J. D., Cleveland, O.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. (See pages 547 and 548.)

SWOBODA, L. J., New York, N. Y. "Lycopart."

UNITED STATES Graphite Co., Saginaw, Mich.

FASTENERS

BELT FASTENERS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BUFFALO Specialty Co., Buffalo, N. Y.

GREENE, Tweed & Co., New York, N. Y.

JENCKES Mfg. Co., E., Worcester, Mass.

SMITH & Co., F. P., Sharon Hill, Pa.

FILES

FILES AND RASPS

AKRON File Co., Akron, O.

AMERICAN—See Nicholson File Co.

AMERICAN Swiss File & Tool Co., New York, N. Y.

ARCADE—See Nicholson File Co.

BARNETT Co., G. & H., Philadelphia, Pa. "Black Diamond."

BLACK DIAMOND—See Barnett Co.

BLACK PRINCE—See Rex File & Saw Co.

CHATTERTON File Works, Providence, R. I.

CHELSEA File Works, Norwich, Conn.

COLONIAL File Co., Neponset, Mass.

DELTA File Works, Philadelphia, Pa.

DISSTON & Sons, H., Philadelphia, Pa.

DIXON, William, 39 John St., New York, N. Y. (Importers.) "Giardon." (See page 485.)

EAGLE—See Nicholson File Co.

GEM City File Works Co., Quincy, Ill.

GLARDON—See Dixon, William.

GOLD MEDAL—See Liveright Bros.

GRAVES File Co., Newark, N. J.

GREAT WESTERN—See Nicholson File Co.

HAYES File Co., Detroit, Mich.

HELLER Bros. Co., Newark, N. J.

J. B. SMITH—See Nicholson File Co.

JOHNSON & Bro. File Co., Newark, N. J. "Reliance."

KEARNEY & FOOT—See Nicholson File Co.

LIVERIGHT Bros., Philadelphia, Pa. "Gold Medal."

McCAFFREY File Co., Philadelphia, Pa.

McCLELLAN—See Nicholson File Co.

MADDEN File Co., Middletown, N. Y.

MURCOTT & Campbell, Brooklyn, N. Y.

NICHOLSON File Co., Providence, R. I. "American," "Arcade," "Eagle," "XF," "McClellan," "Kearney & Foot," "J. B. Smith," "Great Western." (See page 501.)

RELIANCE—See Johnson & Bro. File Co.

REX File & Saw Co., Newcomerstown, O. "Black Prince."

REYNOLDS Bros., Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass.

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa. "Vixen." (See page 713.)

STOKES Bros. Mfg. Co., Freehold, N. J.

TROJAN—See Troy File Works.

TROY File Works, Troy, N. Y. "Trojan."

VIXEN—See Standard Roller Bearing Co.

WESTPHAL File Co., Milwaukee, Wis.

XF—See Nicholson File Co.

FILLETS

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BENSKIN Mfg. Co., Canton, O. "Perfect."

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CLEVELAND Fillet Co., Cleveland, O.

CLEVELAND Galvanizing Works Co., Cleveland, O.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PAGE Belting Co., Concord, N. H.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

FLASKS

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ADAMS Co., Dubuque, Ia.

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

BARNETT Foundry Co., Oscar, Newark, N. J.

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FLASKS (Continued)

FOUNDRY FLASHES (Continued)

BRASS Foundries Supply Co., Newark, N. J.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EUREKA—See Smith & Caffrey Co.

HILL & Griffith Co., Cincinnati, O. (See page 479.)

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

SMITH & Caffrey Co., Syracuse, N. Y. "Eureka."

STERLING Wheelbarrow Co., Milwaukee, Wis.

FLUX

BRAZING FLUX

(See Compounds, Brazing)

SOLDERING FLUX

ALLEN Co., L. B., Chicago, Ill. "Sun," "Sampson." (See page 503.)

ATLANTIC Chemical Works, Brooklyn, N. Y.

BARCY-NICHOLSON Co., Detroit, Mich.

BENSON Co., Alex. R., Hudson, N. Y. "Yagers."

BILLINGS-CLAPP Co., Boston, Mass. "Simplicity."

BLAKE Signal & Mfg. Co., Boston, Mass.

BRUNNER Chemical Works, Cincinnati, O. "Queen."

BURNLEY Battery & Mfg. Co., North East, Pa.

CALLAHAN & Co., Geo., New York, N. Y.

COMO Electrical Co., Spring Lake, N. J. "Hiko."

DIELECTRIC Mfg. Co., St. Louis, Mo.

DUNTON Co., M. W., 65 Atlantic Ave., Providence, R. I. "Nokorode." (See page 485.)

ELLIOTT Chemical Works, Newton, Mass.

EUREKA—See Grasselli Chemical Co.

GRASSELLI Chemical Co., New York, N. Y. "Standard," "Eureka."

HESS & Son, Philadelphia, Pa. "Tinol."

HIKO—See Como Electrical Co.

INCOMPARABLE—See Reade Mfg. Co.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 641.)

McGILL Mfg. Co., Valparaiso, Ind. "Star."

NOCOROSO—See Walsh Co.

NOKORODE—See Dunton & Co.

QUEEN—See Brunner Chemical Works.

READE Mfg. Co., Hoboken, N. J. "Incomparable."

RUBY Chemical Co., Johnstown, O.

SAMPSON—See Allen Co.

SCHNEIDER, Emil, Newark, N. J.

SCHULTZ & Co., A., Baltimore, Md.

SIMPLICITY—See Billings-Clapp Co.

SOLDERALL Co., New York, N. Y.

STANDARD—See Grasselli Chemical Co.

STAR—See McGill Mfg. Co.

SUN—See Allen Co.

TINOL—See Hess & Son.

UNIVERSAL Fluxine Co., Urbana O.

WALSH & Co., John F., Pittsfield, Mass "Nocoroso."

YAGERS—See Benson Co.

WELDING FLUX

(See Compounds, Welding)

FORGES

BLACKSMITHS FORGES

BAUER Bros. Co., Springfield, O. "Cyclone."

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief," "Challenge," "Hero," "Leader."

CANTON Foundry & Machine Co., Canton, O.

CHALLENGE—See Canedy-Otto Mfg. Co.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Steam Gauge Co., Cleveland, O.

CYCLONE—See Bauer Bros. Co.

HERO—See Canedy-Otto Mfg. Co.

LEADER—See Canedy-Otto Mfg. Co.

ROYAL—See Canedy-Otto Mfg. Co.

SILVER Mfg. Co., Salem, O.

STURTEVANT Co., B. F., Hyde Park, Mass.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

FRAMES

HACK SAW FRAMES

(For Hack Saw Blades—See Blades, Hack Saw)

ATKINS & Co., E. C., Indianapolis, Ind. "Hoosier," "Indiana."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. (See page 499.)

CROWN—See Union Hardware Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Eagle," "Keystone."

EAGLE—See Disston & Sons.

EAGLE—See Union Hardware Co.

ELLIS Co., New Haven, Conn.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

GRIFFIN Co., G. W., Franklin, N. H.

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this handy ***emergency*** outfit—the ALLEN Solderset. It mends the broken part. It makes a joint stronger than the original material. It affords that instant repair which relieves general ***strain*** and prevents the weakening of related parts. A little heat and a simple ***touch*** of the solder does the work. Great for the ***batteries.*** Here's a real honest chance to spend a quarter and ***save*** dollars on the repair bill. Send 25 cents for full size sample and mention your dealer's name.

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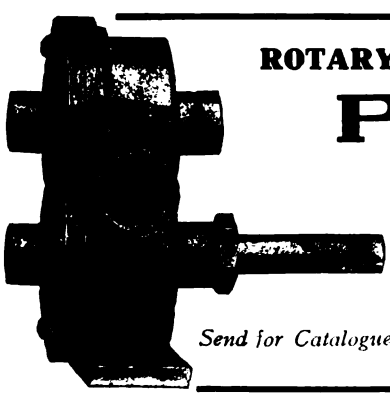

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FRAMES (Continued)

HACK SAW FRAMES (Continued)

HOOSIER—See Atkins & Co.

INDIANA—See Atkins & Co.

KEYSTONE—See Disston & Sons.

MASSACHUSETTS Saw Works, Chicopee, Mass. "Victor."

MILLERS Falls Co., New York, N. Y. "Star."

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SIMONDS Mfg. Co., Fitchburg, Mass.

SMITH & Hemenway Co., New York, N. Y.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNION Hardware Co., Torrington, Conn. "Crown," "Eagle."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

WEST Haven Mfg. Co., New Haven, Conn. "Utility," "Universal."

FULLERS

FULLERS AND SWAGES

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

EVANSVILLE Tool Works, Evansville, Ind.

FISHER & Norris, Trenton, N. J. (See page 565.)

GREEN RIVER—See Wiley & Russell Mfg. Co.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

KLEIN-LOGAN Co., Pittsburg, Pa.

LITTLE GIANT—See Noyes & Co.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

SWETT Iron Works, A. L., Medina, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River."

FURNACES

ANNEALING AND CASE HARDENING FURNACES

AMERICAN Gas Furnace Co., New York, N. Y.

BELLEVUE Furnace Co., 703-11 Bellevue Ave., Detroit, Mich. (See page 505.)

BEST American Calorific Co., W. N., New York, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CHICAGO Flexible Shaft Co., Chicago, Ill. "Stewart."

GANTT—See Witteman Co.

GILBERT & Barker Mfg. Co., 80 Fourth Ave., New York, N. Y. (See page 657.)

HAWLEY Down Draft Furnace Co., Chicago, Ill.

HOSKINS Mfg. Co., Detroit, Mich.

MACLEOD & Co., Walter, Cincinnati, O.

ROCKWELL Co., W. S., New York, N. Y.

SCOTT, C. U., Davenport, Ia.

STEWART—See Chicago Flexible Shaft Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WITTEMAN Co., A. P., 112-16 N. Broad St., Philadelphia, Pa. "Gantt." (See page 489.)

BABBITT MELTING FURNACES

AMERICAN Gas Furnace Co., New York, N. Y.

BEST American Calorific Co, W. N., New York, N. Y.

CHICAGO Flexible Shaft Co., Chicago, Ill.

DAVIS Machine Co., W. P., Rochester, N. Y. "Vesuvius."

ROCKWELL Co., W. S., New York, N. Y.

VESUVIUS—See Davis Machine Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

BRASS AND COPPER MELTING FURNACES

BARNETT Foundry Co., Oscar, Newark, N. J.

BEST American Calorific Co., W. N., New York, N. Y.

BRASS Founders Supply Co., Newark, N. J.

CHICAGO Flexible Shaft Co., Chicago, Ill.

FISHER, Alfred, Chicago, Ill.

HAWLEY Down Draft Furnace Co., Chicago, Ill.

KROESCHELL Bros. Co., Chicago, Ill. "Kroeschell-Schwartz."

KROESCHELL-SCHWARTZ—See Kroeschell Bros. Co.

LITTLEFORD Bros., Cincinnati, O.

M. R. V.—See Wise, J. B.

MONARCH Engineering & Mfg. Co., Baltimore, Md. "Steele-Harvey."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

ROCKWELL Co., W. S., New York, N. Y.

STEELE-HARVEY—See Monarch Engineering & Mfg. Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WHITING Foundry Equipment Co., Harvey, Ill.

WISE, J. B., Watertown, N. Y., "M. R. V."

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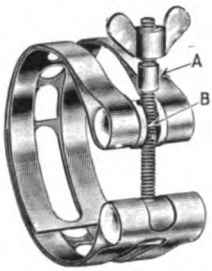

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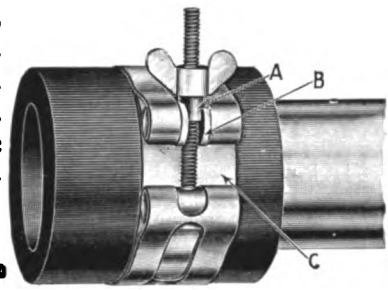

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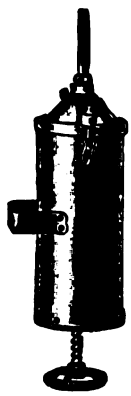

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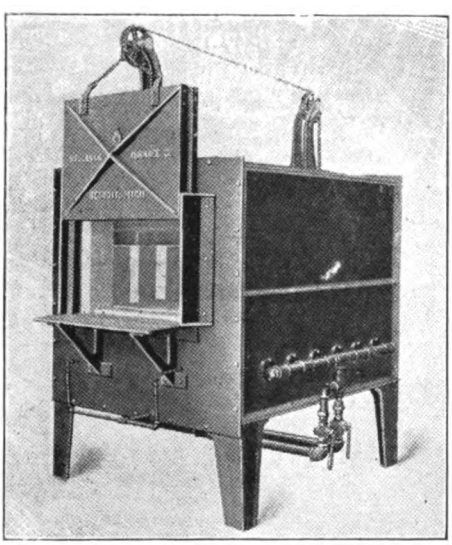

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FURNACES (Continued)

GASOLINE FURNACES

(See Torches, Gasoline)

SOLDERING FURNACES

(See also Torches, Gasoline)

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GAUGES

CENTRE GAUGES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

DEPTH GAUGES

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

DRILL AND WIRE GAUGES

BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 493.)

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

STARRETT Co., L. S., Athol, Mass.

LIMIT GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

LITTLE GIANT—See Wells Bros. Co.

NICHOLS, W. H., Waltham, Mass. (See page 507.)

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ROGERS Works, John M., Gloucester City, N. J.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

PLUG AND RING GAUGES

AMES & Co., B. C., Waltham, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CRONKVIST Drill Chuck Co., Jersey City, N. J. (Importers). "Johansson."

JOHANSSON—See Cronkvist Drill Chuck Co.

LITTLE GIANT—See Wells Bros. Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NASH Engineering Co., Brooklyn, N. Y.

NICHOLS, W. H., Waltham, Mass. (See page 507.)

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ROGERS Works, John M., Gloucester City N. J.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

RING GAUGES

(See Gauges, Plug and Ring)

SCREW PITCH GAUGES

AMES & Co., B. C., Waltham, Mass.

ATHOL Machine Co., Athol, Mass.

BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

HERMANN, K. L., Detroit, Mich.

LITTLE GIANT—See Wells Bros. Co.

NICHOLS, W. H., Waltham, Mass. (See page 507.)

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

SURFACE GAUGES

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

REMINGTON Tool & Machine Co., Boston, Mass.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

WIRE GAUGES

(See Gauges, Drill and Wire)

Complete Index to Classification appears on Pages 8 to 22.

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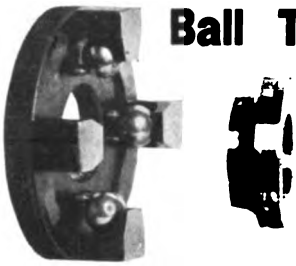


Ball Track Gages

QUICK DELIVERY
ON ACCURATE
JIG AND FIXTURE WORK
PLUG AND RING GAGES
THREAD GAGES, SNAP AND LIMIT GAGES MADE
TO THE HIGHEST DEGREE OF ACCURACY

W. H. NICHOLS **WALTHAM, MASS.**

Patent applied for

HERE IS A MECHANICALLY PERFECT TIRE REGISTER

Accurate, constructed like a watch, this tire pressure gauge is easily the most perfectly built register on the market.

WALKER TIRE PRESSURE REGISTERS

Fit any make of Pump and show at a glance the exact amount of air in the tire. Simply slip over valve stem in tire and the register does the rest.

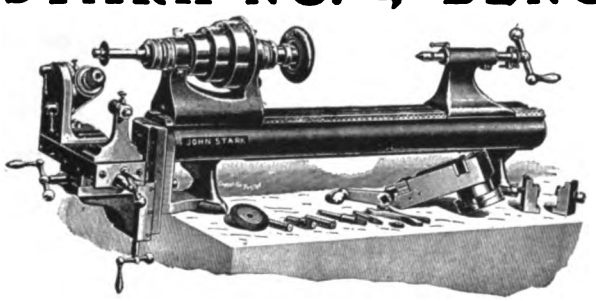
We are helping dealers and jobbers in the sale of these Registers.

Please write for sample—sent free.

Retail Price, $3.00

H. W. WALKER CO., 124-126 Rosenbloom Building **SYRACUSE, N. Y.**

STARK NO. 4 BENCH LATHE



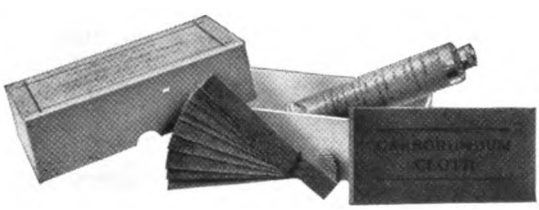
With Milling Machine Attachment

Length of bed, 38 inches—swing 9 inches—capacity of chuck ¾-in.—weight 185 lbs.

STARK LATHE ACCURACY is known and appreciated wherever bench tools are used. We have had 48 years' experience in building these lathes and can guarantee their efficiency absolutely. Ask today for our descriptive Catalogue No. 25.

STARK TOOL COMPANY
Waltham, Mass.

Carborundum Valve Grinding Compound



Carborundum is the hardest and sharpest abrasive known. The Carborundum grains when mixed with a high-grade grease make the best valve grinding compound known. The Carborundum Compound gives a true contact seat in a quarter of the time required by other mediums.

Put up in one, three and five-pound tins for garage use and in handy little tube outfits for the car owner.

Write for samples and discounts.

The CARBORUNDUM COMPANY **Niagara Falls, N. Y.**

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GRINDERS

CHUCKING GRINDERS

BRYANT Chucking Grinder Co., Springfield, Vt.

CRANK PIN GRINDERS

LANDIS Tool Co., Waynesboro, Pa. (See page 483.)

NORTON Grinding Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

TINDEL-ALBRECT—See Tindel-Morris Co.

TINDEL-MORRIS Co., Eddystone, Pa. "Tindel-Albrecht."

CUTTER GRINDERS

(See Grinders, Reamer and Cutter)

CYLINDER GRINDERS

HEALD Machine Co., 22 New Bond St., Worcester, Mass. (See page 509.)

DISC GRINDERS

BESLY & Co., Chas. H., Chicago, Ill. (See page 491.)

DIAMOND Machine Co., Providence, R. I. "Gorton."

GARDNER Machine Co., Beloit, Wis.

GORTON—See Diamond Machine Co.

HOYSTRADT & Case, Kingston, N. Y.

RANSOM Mfg. Co., Oshkosh, Wis. (See page 475.)

ROWBOTTOM Machine Co., Waterbury, Conn. (See page 519.)

TAYLOR & Fenn Co., Hartford, Conn.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

DRILL GRINDERS

AMERICAN—See Diamond Machine Co.

DIAMOND Machine Co., Providence, R. I. "American."

HEALD Machine Co., 22 New Bond St., Worcester, Mass. (See page 509.)

IDEAL Machine Works, Brooklyn, N. Y.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NEW YANKEE—See Wilmarth & Morman Co.

ROBINSON Tool Works, Waterbury, Conn.

WASHBURN Shops, Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich. "New Yankee."

INTERNAL GRINDERS

BATH Grinder Co., Fitchburg, Mass. (See page 475.)

HEALD Machine Co., 22 New Bond St., Worcester, Mass. (See page 509.)

LANDIS Tool Co., Waynesboro, Pa. (See page 483.)

MIAMI Valley Machine Tool Co., Dayton, O.

MODERN Tool Co., Erie, Pa.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

RIVETT Lathe Mfg. Co., Boston, Mass.

THOMPSON Grinder Co., Springfield, O.

PISTON RING GRINDERS

ALERT—See Harding, S. B.

BATH Grinder Co., Fitchburg, Mass. (See page 475.)

BAY State Grinder Co., Worcester, Mass.

HARDING, S. B., Waukesha, Wis. "Alert."

HEALD Machine Co., 22 New Bond St., Worcester, Mass. (See page 509.)

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

WALKER Grinder Co., Worcester, Mass.

PLAIN TOOL GRINDERS

ATHOL Machine Co., Athol, Mass.

BATH Grinder Co., Fitchburg, Mass. (See page 475.)

BLOUNT Co., J. G., Everett Mass. (See page 515.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

BUILDERS Iron Foundry, Providence, R. I.

CANTON Foundry & Machinery Co., Canton, O.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Machine Tool Co., Chicago, Ill.

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

CROWN—See Clizbe Bros. Mfg. Co.

DIAMOND Machine Co., Providence, R. I.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 483.)

MODERN Tool Co., Erie Pa.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

NORTON Grinding Co., Worcester, Mass.

OESTERLEIN Machine Co., Cincinnati, O.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

RANSOM Mfg. Co., Oshkosh, Wis. (See page 475.)

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

ST. Louis Machine Tool Co., St. Louis, Mo.

STAPF & Co., John B., Dunkirk, N. Y.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor."

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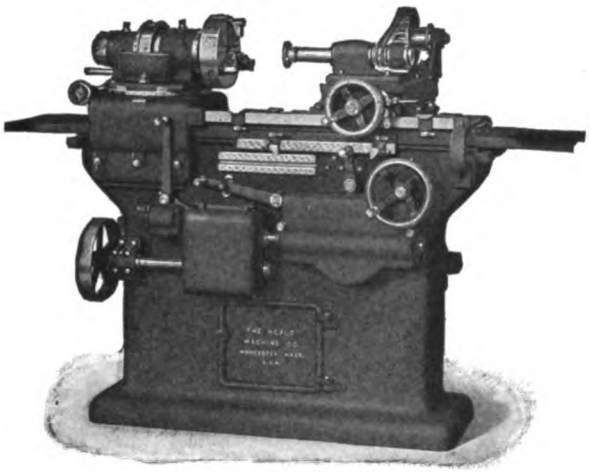
The Heald Internal Grinder



This is a Manufacturing Machine in every sense of the word and marks a great advance in the art of internal grinding. It is massive and rigid; it has five different work speeds and three different rates of table travel for each speed, all instantly available by means of quick change gear boxes. It will halve or quarter the cost of the work done on the ordinary style of internal grinders, as it will cut out stock in place of worrying it out.

This is made possible by the massive design, the heavy work head and more particularly by the construction of the grinding spindle which does not overhang the table, as is usually the case, but is firmly mounted directly on the table, giving it great ability to resist vibration and to cut rapidly, freely and smoothly.

When You Want a Good Hole

you want to grind it, and a good machine to grind it on.

The Heald Internal Grinder

is the machine to use, because it is heavy and rigid and built specially for this work, and will do it quicker and better than is possible on the machines generally used. Grinding gives increased accuracy and a beautiful surface. On thin cylinders and hardened work it is the only practical method of getting good holes. Our catalog is free for the asking and contains valuable suggestions in regard to grinding.

Our special booklet, ***Cylinder Grinding,*** *gives valuable information on the problems for automobile manufacturers.*

The Heald Machine Co.

22 New Bond St., WORCESTER, MASS.

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GRINDERS (Continued)

PLAIN TOOL GRINDERS (Continued)

TAYLOR—See Tabor Mfg. Co.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

WALKER Grinder Co., Worcester, Mass.

WEBSTER & Perks Tool Co., Springfield, O.

REAMER AND CUTTER GRINDERS

BATH Grinder Co., Fitchburg, Mass. (See page 475.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Milling Machine Co., Cincinnati, O.

GREENFIELD Machine Co., Greenfield, Mass.

INGERSOLL-MILLING Machine Co., Rockford, Ill.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

MIAMI Valley Machine Tool Co., Dayton, O.

NATIONAL Machine Co., Hartford, Conn.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

OESTERLEIN Machine Co., Cincinnati, O.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

WALKER Grinder Co., Worcester, Mass.

WELLS & Son Co., F. E., Greenfield, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

WOODS Engineering Co., Alliance, O.

SWING FRAME GRINDERS

PITTSBURG Emery Wheel Co., Pittsburg, Pa.

SAFETY Emery Wheel Co., Springfield, O.

TUCKER Machine Co., Cincinnati, O.

SURFACE GRINDERS

BATH Grinder Co., Fitchburg, Mass. (See page 475.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

DIAMOND Machine Co., Providence, R. I.

GARVIN Machine Co., New York, N. Y.

HEALD Machine Co., 22 New Bond St., Worcester, Mass. (See page 509.)

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 483.)

MIAMI Valley Machine Tool Co., Dayton, O.

NATIONAL Machine Co., Hartford, Conn.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ROWBOTTOM Machine Co., Waterbury, Conn. (See page 519.)

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

THOMPSON Grinder Co., Springfield, O.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

WALKER Grinder Co., Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

UNIVERSAL GRINDERS

BROWN & Sharpe Mfg. Co., Providence, R. I.

LANDIS Tool Co., Waynesboro, Pa. (See page 483.)

MODERN Tool Co., Erie Pa.

NORTON Grinding Co., Worcester, Mass.

MIAMI Valley Machine Tool Co., Dayton, O.

THOMPSON Grinder Co., Springfield, O.

WET TOOL GRINDERS

BLOUNT Co., J. G., Everett, Mass. (See page 515.)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

CHALLENGE Machine Co., Philadelphia, Pa

CHICAGO Machine Tool Co., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

EDGEMONT Machine Co., Dayton, O.

GISHOLT Machine Co., Madison, Wis.

HAYSTRADT & Case, Kingston, N. Y.

LUTTER & Gies, Milwaukee, Wis. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis. (See page 475.)

SELLERS & Co., Wm., Philadelphia, Pa.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

STERLING Emery Wheel Mfg. Co., Tiffin, O.

TUCKER Machine Co., Cincinnati, O.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

WHITNEY Mfg. Co., Hartford, Conn. (See page 705.)

HAMMERS

BRASS AND COPPER HAMMERS

EUREKA Tempered Copper Works, North East, Pa.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

UNION Hardware Co., Torrington, Conn.

WELCH Co., Thomas F., Boston, Mass.

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IMPROVEMENTS VERSUS MERE CHANGES

THERE IS A BIG DIFFERENCE BETWEEN MERE CHANGES AND REAL ESSENTIAL IMPROVEMENTS.

IN DRILL PRESS MANUFACTURE THERE HAVE BEEN MANY CHANGES MADE IN THE PAST THIRTY YEARS, BUT NO REAL ESSENTIAL IMPROVEMENTS OVER THE OLD SENSITIVE DRILL PRESS, UNTIL THE APPEARANCE OF THE

QUICK CHANGE BALL BEARING ELMORE HIGH SPEED DRILL PRESSES

QUICK CHANGE

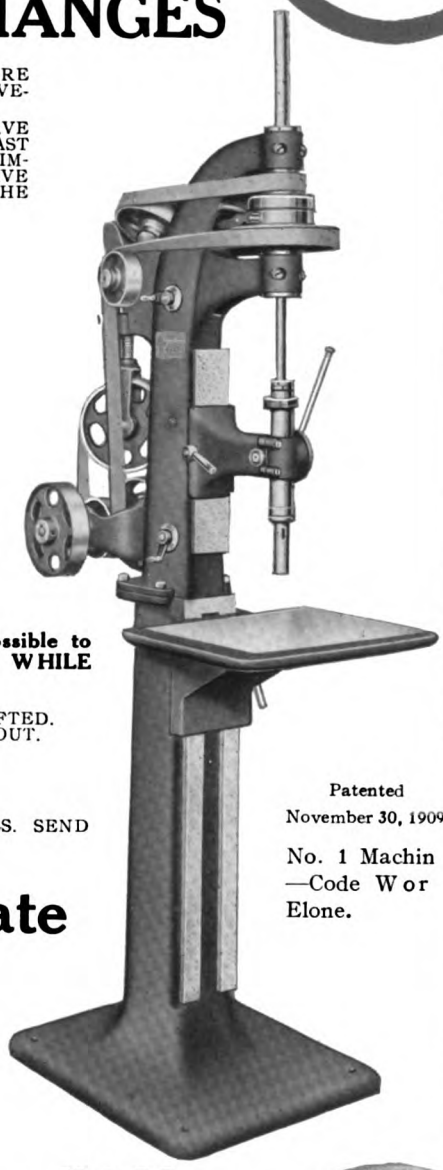
Drill Press

THIS MACHINE MARKS AN EPOCH IN THE HISTORY OF DRILL PRESS MANUFACTURE, AND EMBODIES TIME SAVING, COST REDUCING FEATURES FOUND IN NO OTHER MACHINE, EVERY ONE OF WHICH DEMANDS YOUR CAREFUL INVESTIGATION. AMONG THEM ARE:

New Patent Belt Drive, making it possible to instantly effect four changes of speed WHILE MACHINE IS IN MOTION.

ONE ENDLESS BELT WHICH IS NEVER SHIFTED.
SPECIAL BALL BEARINGS USED THROUGHOUT.
FRICTION REDUCED TO A MINIMUM.
MINIMUM FLOOR SPACE.
SENSITIVE AND EVEN FEED.
GREATER CAPACITY.

IT WILL PAY YOU TO GET THE FULL DETAILS. SEND FOR SPECIAL DRILL PRESS BULLETIN.



Patented November 30, 1909

No. 1 Machin —Code Wor Elone.

The Dwight Slate Machine Co.

Exclusive Makers

HARTFORD, CONN.

For sale by

Manning, Maxwell & Moore

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85, 87, 89 Liberty Street, New York

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Chicago, Ill. Milwaukee, Wis.
Indianapolis, Ind. Atlanta, Ga.

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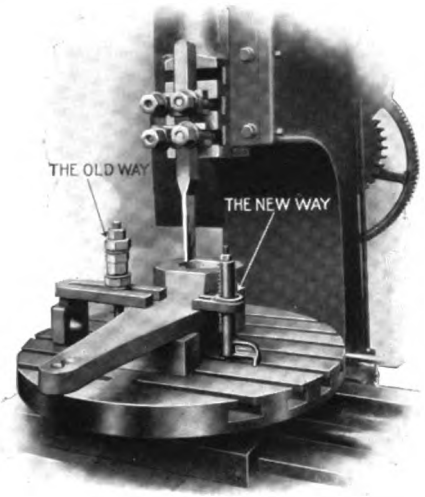
HOWELL ADJUSTABLE WORK CLAMP

AN AID TO EFFICIENCY, INVALUABLE TO EMPLOYERS OF LABOR. IT SAVES TIME FOR YOUR WORKMAN; ENABLES HIM TO DO BETTER WORK AND INCREASE HIS OUTPUT.

The Old Way

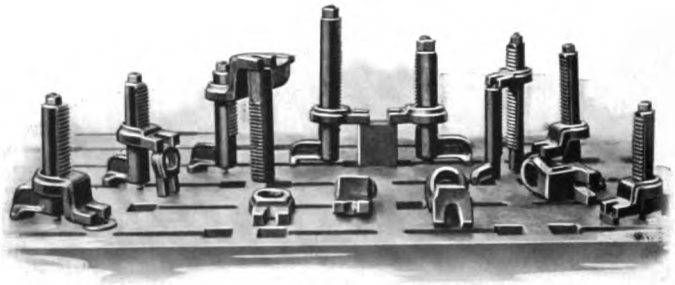
THE OLD WAY IS THE EXPENSIVE WAY—INCONVENIENT, TIME-WASTING AND MONEY WASTING. THE WORK IS HELD IN PLACE BY BOLTS, BLOCKS AND NUTS. EVERY NECESSARY CHANGE OF POSITION REQUIRES A CAREFUL READJUSTMENT OF THESE CLUMSY ACCESSORIES AT EXPENSE OF TIME AND EFFICIENCY.



The New Way

THE HOWELL ADJUSTABLE WORK CLAMP HOLDS THE WORK ON THE DRILLING MACHINE OR TABLE WITH A DEPENDABLE GRIP. IT TAKES ONLY A SECOND TO BE READY FOR WORK. THE WIDE RANGE ENABLES IT TO BE ADJUSTED TO ANY POSITION REQUIRED WITHOUT INCONVENIENCE OR LOSS OF TIME AND TO BE USED SINGLY OR IN ANY DESIRED COMBINATION.

SIMPLE, DEPENDABLE, EFFICIENT



CUT SHOWING DIFFERENT SIZES OF HOWELL ADJUSTABLE WORK CLAMP.
WRITE FOR FULL DETAILS.

Howell & Murray, Waverly, N. Y.

AGENTS:

Manning, Maxwell & Moore

INCORPORATED

85, 87, 89 Liberty Street, New York

New York, N. Y. Boston, Mass.
Phila., Penn. Detroit, Mich.
Chicago, Ill. Milwaukee, Wis.
Indianapolis, Ind. Atlanta, Ga.

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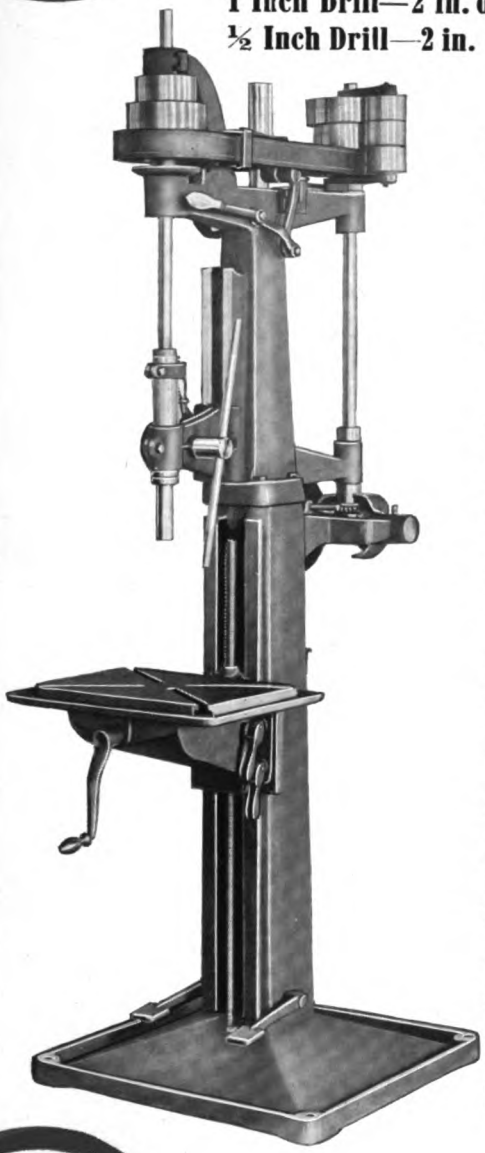
The Latest Evolution in Drilling Machines

1 Inch Drill—2 in. deep—16 seconds
½ Inch Drill—2 in. deep—6 seconds



Can You Equal It?

Power and Convenience Paramount

Write for Details

FRANCIS REED CO.

WORCESTER, MASS.

Specifications—"Reed" 16-Inch High Speed Drilling Machine.

Diameter of spindle in cone..15/16"
Diameter of spindle in quill..1"
Diameter of spindle quill.....1¾"
Length of quill.....8"
Vertical run of spindle.....6¼"
Vertical run of head.....9½"
Vertical run of table.....30"
Size of table.....12"—16"
Size of base.....25"
Greatest distance spindle to table .....36"
Capacity .....1" H. S. Drills
No. taper in spindle.....No. 3
Drill to center of.....16" Circle
Tight and loose pulleys.....8"—3"
Sizes of cones.....4¼"—5 11/16"—7 1/16"
Width of belt for spindle cone.2" Special
Width of belt for counter....3"
Top belt length. C. C.....34"
Diameter of back shafts.....1 1/16"
Length of rear bearings.....3"
Speed of counter.....750 R.P.M.
Speed of spindle.....450—750—1250 R.P.M.
Total height.....7' 6"
Projected floor space.....25"—37"
Weight .....480 lbs.

AGENTS:

Manning, Maxwell & Moore

INCORPORATED

85, 87, 89 Liberty Street, NEW YORK

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45 Oliver St., Boston
Frisco Bldg., St. Louis
Park Bldg., Pittsburg
1262 Ontario St., Cleveland
Candler Bldg, Atlanta
Monadnock Bldg., San Francisco
Traction Terminal Bldg., Ind.
White Bldg., Buffalo
Majestic Bldg., Detroit
Merrill Bldg., Milwaukee
Yokohama, Japan

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RADIATORS

A new design of square tube radiators of an especially attractive type at a very attractive price and withal of the highest efficiency. It will be well worth your while to know all about this. We also make flat tube, vertical and honeycomb radiators. A complete catalog sent on request. Ask.

STEERING GEARS AND STEERING WHEELS, TRANSMISSIONS AND DIFFERENTIALS, CONTROL LEVERS

The Spencer Gear-Driven Air Pump

An Air Pump that is always on the car, always ready and that doesn't have to be operated by hand. Built as an air pump should be built, with no leather washers or packing and with drop forged, ground pistons using piston rings. It attaches to frame of car by a bracket and is driven by gear from shaft driving pump or magneto operating only when inflating tire.

Used as regular equipment on Pierce-Arrow Cars.

Should be on all good cars.

Let us make you a proposition to put it on your cars.

Let's do it now.

CENTAUR MOTOR CO.,

DETROIT BUFFALO

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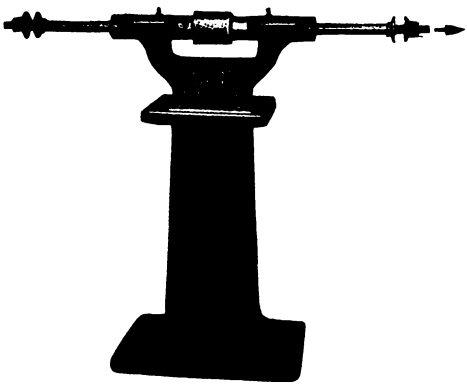
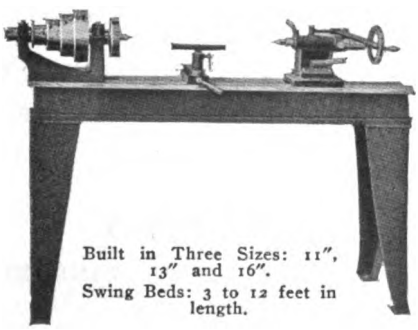
J. G. BLOUNT CO.

EVERETT, MASS.

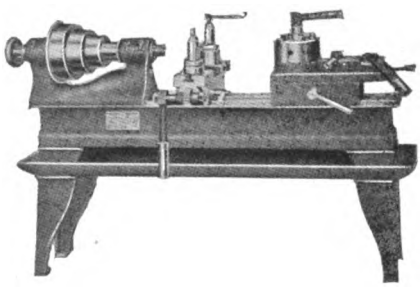


Built in Six Sizes.

Built in Two Sizes.



Built in Three Sizes: 11", 13" and 16".
Swing Beds: 3 to 12 feet in length.



Built in Seven Sizes
Wheels from 6 to 30 inches.

20" x 2½" Motor Driven.

Built in Five Sizes.

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HAMMERS (Continued)

CLAW HAMMERS

ATHA Tool Co., Newark, N. J.

CENTRAL Hardware Co., Philadelphia, Pa.

CHENEY Hammer Co., H., Little Falls, N. Y.
(See page 503.)

H. & B.—See Humason & Beckley Mfg. Co.

HUMASON & Beckley Mfg. Co., New Britain, Conn. "H. & B."

MAYDOLE Hammer Co., David, Norwich, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

MACHINISTS HAMMERS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BUFFUM Tool Co., Louisiana, Mo.

CHENEY Hammer Co., H., Little Falls, N. Y.
(See page 503.)

EVANSVILLE Tool Works, Evansville, Ind.

H. & B.—See Humason & Beckley Mfg. Co.

HELLER Bros. Co., Newark, N. J.

HUMASON & Beckley Mfg. Co., New Britain, Conn. "H. & B."

MAYDOLE Hammer Co., David, Norwich, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VLCHEK Tool Co., Cleveland, O.
(See page 481.)

WARNER Hammer Co., Cromwell, Conn.

PNEUMATIC HAMMERS

(See Tools, Pneumatic)

POWER HAMMERS

BEAUDRY & Co., Boston, Mass. "Champion."

BECHE—See Nazel Engineering & Machine Works.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BLISS Co., E. W., Brooklyn, N. Y.

BRADLEY & Son, C. C., Syracuse, N. Y.

CHAMPION—See Beaudry & Co.

DIENELT & Eisenhardt, Philadelphia, Pa.

JUSTICE & Co., P. S., Philadelphia, Pa.

McLANE, J. B., North Reading, Mass.

MACGOWAN & Finigan Foundry & Machine Co., St. Louis, Mo. "Perfect."

MAYER Bros., Mankato, Minn.

MERRILL Bros. Co., Maspeth, N. Y.

NAZEL Engineering & Machine Works, Philadelphia, Pa. "Beche."

NILES-BEMENT-POND Co., New York, N. Y.

NOVELTY Iron Works, Dubuque, Ia.

PERFECT—See Macgowan & Finigan Foundry & Machine Co.

PETTINGELL Machine Co., Amesbury, Mass.

SCRANTON & Co., New Haven, Conn.

TOLEDO Machine & Tool Co., Toledo, O.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WILLIAMS, White & Co., Moline, Ill.

STEAM HAMMERS

ALLIANCE Machine Co., Alliance, O.

BUFFALO Foundry & Machine Co., Buffalo, N. Y.

CHAMBERSBURG Engineering Co., Chambersburg, Pa.

ERIE Foundry Co., Erie, Pa.

McDOUGALL & Potter Co., New York, N. Y.

MORGAN Engineering Co., Alliance, O.

NILES-BEMENT-POND Co., New York, N. Y.

SELLERS & Co., Wm., Philadelphia, Pa.

HANDLES

FILE AND TOOL HANDLES

BEST—See Troy File Works.

BLISS Mfg. Co., R., Pawtucket, R. I.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

NIAGARA Handle & Ferrule Co., Baltimore, Md.

OHIO Tool Co., Columbus, O.

OSGOOD, J. L., Buffalo, N. Y.

PIQUA Handle & Mfg. Co., Piqua, O.

SANDUSKY Tool Co., Sandusky, O.

TROY File Works, Troy, N. Y. "Best."

UNION Hardware Co., Torrington, Conn.

HEATERS

GLUE HEATERS

ADVANCE Machinery Co., 517-29 Hamilton St., Toledo, O. "Wetmore."
(See page 517.)

WETMORE—See Advance Machinery Co.

Complete Index to Classification appears on Pages 8 to 22.

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COPPER BRASS IRON STEEL

Glue Room Appliances

Model "A"
2 gals. to 500 gals.
Steam, Gas, Electricity
For reducing Glue Jelly to Liquid.

Prevent Scum.
Prevent Evaporation.
Prevent Sour Glue
Keep Glue off Floor.
Prevent Overheating.
Prevent Acid from Boiler Compounds getting into Glue.
Prepare and Handle Glue in one-fourth the time

64-Page Catalogue

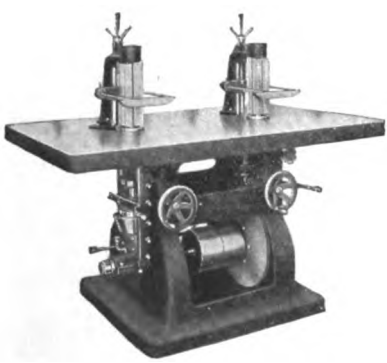
Model "U-1" Steam.
For use at bench of workmen.
1 qt. to 2 gals.

Model "R-J" Electric.
Current required—
One hour per day.
1 pt. to 1 gal.

BALL BEARINGS

Auto-Body Shaper

BALL BEARINGS



One-third the floor space.
20 per cent. greater power.
No Countershaft Required.
Started and stopped with lever at front of machine.
Operator can work from all four sides of machine.
Saves enough in 5 years in Belt Bills alone to pay for itself.

The Advance Machinery Company

517-529 HAMILTON STREET, TOLEDO, OHIO

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HOLDERS

LATHE AND PLANER TOOL HOLDERS

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass.
(See page 539.)

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BOWN Machine Co., Battle Creek, Mich.

CARR—See Thompson & Son Co.

CHAMPION—See Western Tool & Mfg. Co.

COLTON Combination Tool Co., Chester, Vt.

FAIRBANKS Co., Springfield, O. "United States."
(See page 519.)

HILL Standard Mfg. Co., Anderson, Ind.

LANG Co., G. R., Meadville, Pa.

MINGST, C. P., Evansville, Ind.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

TAIT—See Van Doren Mfg. Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Carr."

UNITED STATES—See Fairbanks Co.

VAN Doren Mfg. Co., Chicago Heights, Ill. "Tait."

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

HORSES

HORSES, TRESTLES AND TRUCKS

BECKERT, Wm., Allegheny, Pa.

FRASSE & Co., Peter A., 417-21 Canal St., New York, N. Y.
(See page 447.)

NELSON, Olof, 4529 State St. Chicago, Ill.

INDICATORS

SPEED INDICATORS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Son, Edward, Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

GRANT Mfg. & Machine Co., 100 Silliman Ave., Bridgeport, Conn. "Tabor."
(See page 501.)

MIXTER Saw Tool Co., J. W., Plymouth, Mass.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.)
(See page 529.)

STARRETT Co., L. S., Athol, Mass.

TABOR—See Grant Mfg. & Machine Co.

VEEDER, Mfg. Co., Hartford, Conn.

WOODMAN Mfg. & Supply Co., R., Boston, Mass.

IRONS

TUYERE IRONS

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

HUNTSVILLE Foundry & Machine Works, Huntsville, Ala.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

NATIONAL Novelty Corp., New York, N. Y.

ROOTS Co., P. H. & F. M., Connersville, Ind.

SWETT Iron Works, A. L., Medina, N. Y.

JIGS

UNIVERSAL JIGS

FORTIN Tool Co., B. P., Hartford, Conn

JOINTERS

GLUE JOINTERS

BERLIN Machine Co., Beloit, Wis.

FALLS Machine Co., Sheboygan Falls, Wis.
(See page 589.)

FAY & Egan Co., Cincinnati, O.

LINDERMAN Machine Co., Muskegon, Mich.

KETTLES

SODA AND POTASH KETTLES

BROWN & Sharpe Mfg. Co., Providence, R. I.

GRAY & Prior Machine Co., Hartford, Conn.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 657.)

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

KEYS

MACHINE KEYS

AKRON Machine Co., Akron, O.

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 607.)

WHITNEY Mfg. Co., Hartford, Conn, "Woodruff."
(See page 705.)

WOODRUFF—See Whitney Mfg. Co.

Complete Index to Classification appears on Pages 8 to 22.

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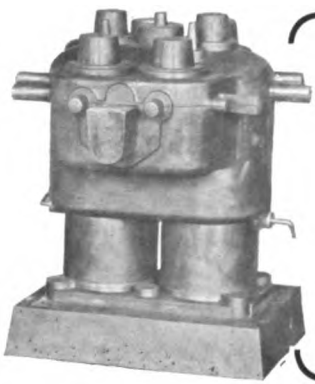
United States Turning Tools

are built to stand up under heavy cuts. The clamp screw is but one of the leading points; our catalog tells about the others.

THE FAIRBANKS CO., Springfield, O.



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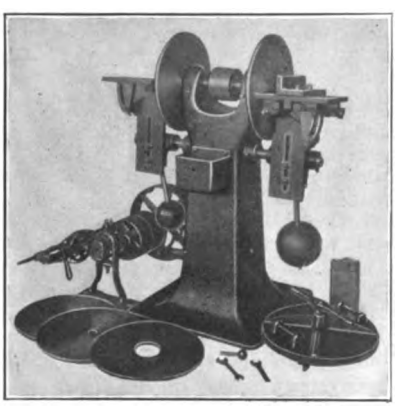
13-17 Perry Street, cor. Washington
Buffalo, N. Y.

Wood and Metal Patterns
Automobile Patterns Our Specialty
Cylinders, Crank Cases, Exhaust Pipes, Etc.

The "Ball Bearing" Disc Grinder



gives you a decided advantage over your competitor. You are able to double on your production without drawing on your power plant for additional power, which means a greater production for the same expense.

Made with 12", 18" and 26" Discs

Ask us for particulars

ROWBOTTOM MACHINE CO. WATERVILLE, CONN.

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KNURLS

KNURLING WHEELS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MILLER Tool Co., New Britain, Conn.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

WELCH Co., Thomas F., Boston, Mass.

LACQUERS

METAL LACQUERS

AMERICAN Lacquer Co., Bridgeport, Conn.

BARRETT & Co., M. L., Chicago, Ill.

CELLULOID Zapon Co., New York, N. Y.

EGYPTIAN Lacquer Mfg. Co., New York, N. Y.

HANSON & Van Winkle Co., Newark, N. J.

MAAS & Waldstein Co., New York, N. Y.

NEW Era Lustre Co., New Haven, Conn.

NIKOLAS & Co., G. J., Chicago, Ill.

ZINSSER & Co., W., New York, N. Y.

LATHES

BENCH OR PRECISION LATHES

AMERICAN Watch Tool Co., Waltham, Mass.

AMES & Co., B. C., Waltham, Mass.

CATARACT—See Hardinge Bros.

ELGIN Tool Works, Elgin, Ill.

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

HARDINGE Bros., Chicago, Ill. "Cataract."

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

REMINGTON Tool & Machine Co., Boston, Mass.

RIVETT Lathe Mfg. Co., Boston, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

SLOAN & Chace Mfg. Co., Newark, N. J.

STARK Tool Co., Waltham, Mass.
(See page 507.)

TAYLOR & Fenn Co., Hartford, Conn.

VAN NORMAN—See Waltham Watch Tool Co.

WALTHAM Machine Works, Waltham, Mass.

WALTHAM Watch Tool Co., Springfield, Mass. "Van Norman."

BUFFING LATHES

(See Machines, Buffing and Polishing)

CRANK PIN LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BOGERT, John L., Flushing, N. Y.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

TINDEL-MORRIS Co., Eddystone, Pa.

ENGINE LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

BRADFORD Machine Tool Co., Cincinnati, O.

BRIDGEFORD Machine Tool Works, Rochester, N. Y.

CARROLL-JAMIESON Machine Tool Co., Batavia, O.

CHAMPION Tool Works Co., 2421 Spring Grove Ave., Cincinnati, O.
(See page 521.)

CINCINNATI Lathe & Tool Co., Cincinnati, O.

DAVIS Machine Co., W. P., Rochester, N. Y.

DETRICK & Harvey Machine Co., Baltimore, Md.

FAIRBANKS Co., Springfield, O.
(See page 519.)

FAY Machine Tool Co., Glenwood Ave. & Second St., Philadelphia, Pa.
(See page 523.)

FAY & Scott, Dexter, Me.

FITCHBURG Machine Works, Fitchburg, Mass. "Lo-Swing."

FLATHER & Co., Nashua, N. H.

GREAVES, Klusman & Co., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

JOHNSON, Jr., Co., Israel, H., Philadelphia, Pa.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LO-SWING—See Fitchburg Machine Works.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MIAMI Valley Machine Tool Co., Dayton, O

MILWAUKEE Machine Tool Co., Milwaukee, Wis.

MORRIS Foundry Co., John B., Cincinnati, O. "Schellenbach."

NEW Haven Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

PRENTICE Bros. Co., Worcester, Mass.

PUTNAM Machine Co., Fitchburg, Mass.

RAHN-LARMON Co., Cincinnati, O.

REED Co., F. E., Worcester, Mass.

ROBBINS Machine Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford Ill.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKFORD Tool Co., Rockford, Ill.

SCHELLENBACH—See Morris Foundry Co

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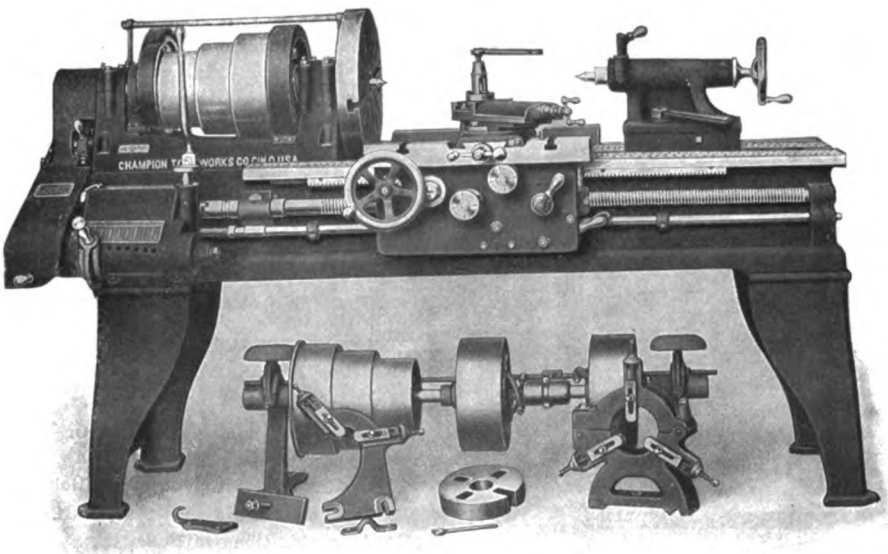
NEW PATENTED

16-Inch Double Back Geared

CHAMPION LATHE



THE LEVER shown on front of the Lathe Head actuates the Back Gear Clutch for changing from single back gear to double back gear, or fast or slow spindle speed, or vice versa, while running.

LOOK AT THE TIME SAVED by this method of improved speed changing as compared with the old style double back gear, where the operator is obliged to stop his machine, walk to the rear, move over by hand and into mesh the double back gear, and return to his position in front of the machine before he can commence work. Then he is compelled to repeat all this when he wishes to change back to high speed again.

With our improved type he can make either change in the fraction of a second and not stop his machine.

This one feature is enough to decide the question of which Lathe.

BUT SEND FOR OUR CATALOGUE

And learn all the facts of the **CHAMPION IMPROVED QUICK CHANGE AND STANDARD LATHES. 10, 12, 14, 16 and 18-inch.**

CHAMPION TOOL WORKS CO.

2421 Spring Grove Avenue

CINCINNATI, OHIO, U. S. A.

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LATHES (Continued)

ENGINE LATHES (Continued)

SCHUMACHER & Boye, Cincinnati, O.

SEBASTIAN Lathe Co., Cincinnati, O.

SENECA Falls Mfg. Co., Seneca Falls, N. Y.

SHEPARD Lathe Co., Cincinnati, O.

SOUTH Bend Machine Tool Co., South Bend, Ind.

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

VON Wyck Machine Tool Co., Cincinnati, O.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

FORMING LATHES

MERIDEN Machine Tool Co., Meriden, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

WARNER & Swasey Co., Cleveland, Ohio.

POLISHING LATHES

(See Machines, Buffing and Polishing)

PRECISION LATHES

(See Lathes, Bench or Precision)

TURRET LATHES

ACME Machine Tool Co., Cincinnati, O.

AMERICAN Tool Works Co., Cincinnati, O.

AMERICAN Tool & Machine Co., Boston, Mass. (See page 553.)

BARDONS & Oliver, Cleveland, O.

BOGERT, John L., Flushing, N. Y.

BRADFORD Machine Tool Co., Cincinnati, O.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BULLARD Machine Tool Co., Bridgeport, Conn.

DAVIS Machine Co., W. P., Rochester, N. Y.

DRESES Machine Tool Co., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

GISHOLT Machine Co., Madison, Wis.

HAMILTON Machine Tool Co., Hamilton, O.

HARTNESS—See Jones & Lamson Machine Co.

INTERNATIONAL Machine Tool Co., Indianapolis, Ind. "Libby."

JONES & Lamson Machine Co., Springfield, Vt. "Hartness."

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LIBBY—See International Machine Tool Co.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MERIDEN Machine Tool Co., Meriden, Conn.

MILWAUKEE Machine Tool Co., Milwaukee, Wis.

NILES-BEMENT-POND Co., New York, N. Y.

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

PRENTICE Bros. Co., Worcester, Mass.

RAHN-LARMON Co., Cincinnati, O.

REED Co., F. E., Worcester, Mass.

SCHUMACHER & Boye, Cincinnati, O.

SMURR & Kamen Machine Co., Chicago, Ill.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEINLE Turret Machine Co., Madison, Wis.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WARNER & Swasey Co., Cleveland, O.

WELLS & Son Co., F. E., Greenville, Mass.

WOOD Turret Machine Co., Brazil, Ind.

WOODWORKING LATHES

AMERICAN Sawmill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, Ohio. (See page 535.)

FAY & Egan Co., J. A., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

OBER Mfg. Co., Chagrin Falls, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

ROBBINS Machine Co., Worcester, Mass.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

LETTERS

PATTERN LETTERS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BLISS Mfg. Co., E. C., 91 Sabin St., Providence, R. I. (See page 625.)

BRIM, A. W., Seneca Falls, N. Y.

BUTLER, A. G., New York, N. Y.

CLEVELAND Fillet Co., Cleveland, O.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

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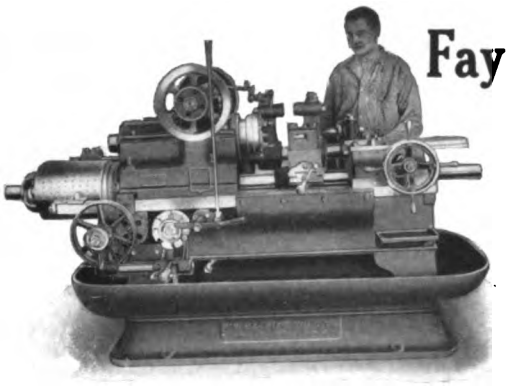

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14 Inch **18 Inch**

FOR

Rear Axle Differential

BEVEL GEARS

Transmissson

SPUR GEARS

BALL RACES, PISTONS, PISTON RINGS

We have a complete equipment of **Fay Automatic Lathes** for manufacturing quickly and cheaply any of the above

SEND BLUE PRINTS FOR ESTIMATES

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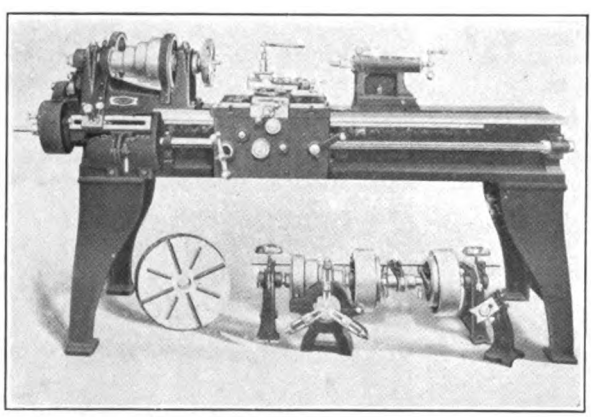
Glenwood Avenue and Second Street, PHILADELPHIA, U.S.A.



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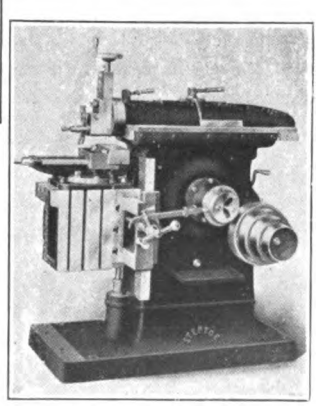
Garage Owners
Machine Shops



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DRILLS GRINDERS
SHAPERS MOTORS, ETC.

Send for Latest List of our New and Second-hand Machinery.

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ATHOL Machine Co., Athol, Mass.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

DAVIS & Cook, Watertown, N. Y.

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SMITH Co., E. G., Columbia, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

STRATTON Level Co., Greenfield, Mass.

LOCKERS

METAL CLOTHES LOCKERS

BUFFALO Wire Works Co., Buffalo, N. Y.

CARPENTER-McWATTERS Sales Co., Cleveland, O.

CLARK Co., W. J., Salem, O.

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y. (See page 755.)

DARBY & Sons Co., Edward, Philadelphia, Pa.

DURAND Steel Locker Co., Chicago, Ill.

FEDERAL Steel Fixture Co., Chicago, Ill.

GENERAL Fireproofing Co., Youngstown, O.

HART & Cooley Co., New Britain, Conn.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MERRITT Co., Camden, N. J.

NEW BRITAIN Machine Co., New Britain, Conn.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SMITH Wire & Iron Works, F. P., Chicago, Ill.

TERRELL'S Equipment Co., Grand Rapids, Mich.

VAN Dorn Iron Works, Cleveland, O.

MACHINERY

DEALERS IN MACHINERY

(This is a list of Dealers in Machinery who advertise in this Publication.)

BRAUN, J. G., 615-21 S. Paulina St., Chicago, Ill. (See page 639.)

FRASSE & Co., Peter A., 130-32 Worth St., New York, N. Y. (See page 447.)

TOOMEY, Frank, 127-31 N. Third St., Philadelphia, Pa. (See page 523.)

SAND MIXING AND CONVEYING MACHINERY

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

SELLERS Co., Wm., Philadelphia, Pa.

STANDARD Sand & Machine Co., Cleveland, O.

MACHINES

ABRASIVE METAL CUTTING MACHINES

SLACK Mfg. Co., Springfield, Vt.

AUTOGENOUS WELDING MACHINES

ALTON, Laine & Co., Long Island City, N. Y.

AMERICAN Oxygen Co., Philadelphia, Pa.

DAVIS-BOURNONVILLE Co., New York, N. Y.

DELCAMPE Welding Co., 353 Pierce Ave., Long Island City, N. Y. (See page 527.)

DEPPELER Co., J. H., Jersey City, N. J.

INDUSTRIAL Oxygen Co., New York, N. Y.

LINDE Air Products Co., Buffalo, N. Y.

MACLEOD & Co., Walter, Cincinnati, O.

MORGAN, B., Newport, R. I.

OXY-CARBI Co., New Haven, Conn. (See page 525.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SCHAAP Flame Utilities Corp., Brooklyn, N. Y.

SOWERS Mfg. Co., Buffalo, N. Y.

UNION Welding Co., New York, N. Y.

WASHINGTON Automobile Supply Co., Washington, Ill. (See page 631.)

WATERHOUSE Co., Boston, Mass.

BEADING MACHINES

(See Machines, Crimping and Beading)

BOLT HEADING MACHINES

ACME Machinery Co., Cleveland, O.

AJAX Mfg. Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn.

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

NATIONAL Machinery Co., Tiffin, O.

NEW Doty Mfg. Co., Jamesville, Wis.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

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COMPLETE OUTFITS

¶ Our great success in repairs of all kinds proves that we make the most reliable Welding Apparatus.

¶ Very latest developments in each part.

¶ The first successful Welders of Aluminum in New England.

¶ Send repairs to us.

OXY-CARBI COMPANY

NEW HAVEN, CONNECTICUT

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MACHINES (Continued)

BOLT POINTING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn.

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

DETRICK & Harvey Machine Co., Baltimore, Md.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa. (See page 473.)

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co. New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

BOLT THREADING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn.

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

DETRICK & Harvey Machine Co., Baltimore, Md.

FOOTE-BURT Co., Cleveland, O. "Reliance."

GREEN RIVER—See Wiley & Russell Mfg. Co.

HERCULES—See Reece Co.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa. (See page 473.)

LITTLE GIANT—See Wells Bros. Co.

MUMMERT, Wolfe & Dixon Co., Hanover, Pa.

NATIONAL Machinery Co., Tiffin, O.

NEWTON Machine Tool Works, Philadelphia, Pa.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

REECE Co., E. F., Greenfield, Mass. "Hercules."

RELIANCE—See Foote-Burt Co.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River."

BORING MACHINES

(Horizontal)

BEAMAN & Smith Co., Providence, R. I.

BINSSE Machine Co., Harrison, N. J.

DETRICK & Harvey Machine Co., Baltimore, Md.

EPSEN-LUCAS Machine Works, Philadelphia, Pa.

GISHOLT Machine Co., Madison, Wis.

LUCAS Machine Tool Co., Cleveland, O.

NEWTON Machine Tool Works, Philadelphia, Pa.

NILES-BEMENT-POND Co., New York, N. Y.

ROCHESTER Boring Machine Co., Rochester, N. Y.

SELLERS & Co., Wm., Philadelphia, Pa.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BORING MACHINES

(Vertical)

BAKER Bros., Toledo, O.

BULLARD Machine Tool Co., Bridgeport, Conn.

COLBURN Machine Tool Co., Franklin, Pa.

FLATHER Mfg. Co., E. J., Nashua, N. H.

HOEFER Mfg. Co., Freeport, Ill.

KING Machine Tool Co., Cincinnati, O.

MOLINE Tool Co., Moline, Ill.

NILES-BEMENT-POND Co., New York, N. Y.

ROCKFORD Drilling Machine Co., Rockford, Ill.

UNDERWOOD & Co., H. B., Philadelphia, Pa.

BUFFING AND POLISHING MACHINES

BENNETT-O'CONNELL Co., Chicago, Ill.

BLOUNT Co., J. G., Everett, Mass. (See page 515.)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

BUILDERS Iron Foundry, Providence, R. I.

CHALLENGE Machine Co., Philadelphia, Pa.

DIAMOND Machine Co., Providence, R. I.

FOX Machine Co., Grand Rapids, Mich.

GARLAND—See Sibley-Houfley Machine Co.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 735.)

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis. (See page 475.)

ST. Louis Machine Tool Co., St. Louis, Mo.

SIBLEY-HOUFLEY Machine Co., Detroit, Mich. "Garland."

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WEBSTER & Perks Tool Co., Springfield, O.

CAM CUTTING MACHINES

MANVILLE Bros. Co., Waterbury, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

STANDARD Machinery Co., Providence, R. I.

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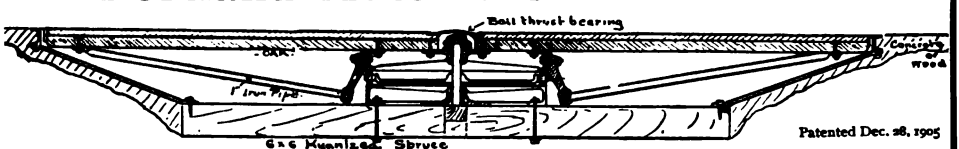

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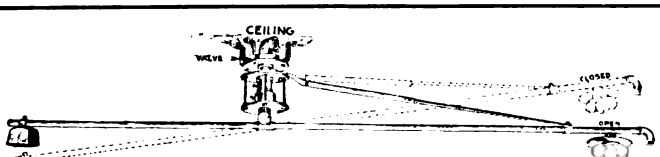

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MACHINES (Continued)

CORE MAKING MACHINES

BROWN Specialty Machinery Co., Chicago, Ill. "Hammer."

DIAMOND Clamp & Flask Co., Richmond, Ind.

FALLS Mfg. Co., Cuyahoga Falls, O. "Wadsworth."

HAMMER—See Brown Specialty Machinery Co.

KENT Mfg. Co., Kent, O.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

WADSWORTH—See Falls Mfg. Co.

CORE WIRE STRAIGHTENING AND CUTTING MACHINES

BLAKE Mfg. Co., Geo. F., New York, N. Y. "Climax."

CLIMAX—See Blake Mfg. Co.

GREGG Mfg. Co., Cleveland, O.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

CRIMPING AND BEADING MACHINES

AMERICAN Can Co., Chicago, Ill.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PETTINGELL Machine Co., Amesbury, Mass.

SWAINE Mfg. Co., Fred J., St. Louis, Mo.

CUTTING-OFF MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

DAVIS Machine Co., W. P., Rochester, N. Y.

HURLBUT-ROGERS Machine Co., S. Sudbury, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ELECTRIC WELDING MACHINES

TOLEDO Electric Welding Co., Cincinnati, O.

THOMSON Electric Welding Co., Lynn, Mass.

WINFIELD Electric Welding Machine Co., Warren, O.

FILING MACHINES

AMES & Co., B. C., Waltham, Mass.

COCHRAN-BLY Co., Rochester, N. Y.

HARTFORD—See Robinson Tool Works.

ROBINSON Tool Works, Waterbury, Conn. "Hartford."

SIMPLEX Mfg. Co., New York, N. Y.

GEAR CUTTING MACHINES

BARBER-COLMAN Co., Rockford, Ill.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Gear Cutting Machine Co., Cincinnati, O.

FELLOWS Gear Shaper Co., 24 Pearl St., Springfield, Vt. (See page 487.)

FLATHER Mfg. Co., E. J., Nashua, N. H.

GARVIN Machine Co., New York, N. Y.

GLEASON Works, Rochester, N. Y.

GOULD & Eberhardt, Newark, N. J.

GRANT-LEES Machine Co., Cleveland, O.

LEES-BRADNER Co., Cleveland, O. (See page 211.)

NEWARK Gear Cutting Machine Co., Newark, N. J.

NEWTON Machine Tool Works, Philadelphia, Pa.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

SLOAN & Chace Mfg. Co., Newark, N. J.

STANDARD Mfg. Co., Bridgeport, Conn.

WHITON Machine Co., D. E., New London, Conn. (See page 555.)

GEAR GRINDING MACHINES.

GEAR Grinding Machine Co., Detroit, Mich. "Ward."

WARD—See Gear Grinding Machine Co.

GEAR HOBBING MACHINES

ADAMS, Co., Dubuque, Iowa.

GOULD & Eberhardt, Newark, N. J.

LEES-BRADNER CO., Cleveland, O. (See page 211.)

MEISSELBACH-CATUCCI Mfg. Co., Newark, N. J.

REYNOLDS Machine Co., Moline, Ill.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

GEAR TOOTH CHAMFERING MACHINES

INGLE Machine Co., Rochester, N. Y "Rochester." (See page 553.)

LONG Arm System Co., Cleveland, O.

ROCHESTER—See Ingle Machine Co.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

HAIR PICKING MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O. (See page 555.)

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The New Hobbing Process

Gears produced therewith *cost less to make*, are *theoretically correct*, and, what is most important,

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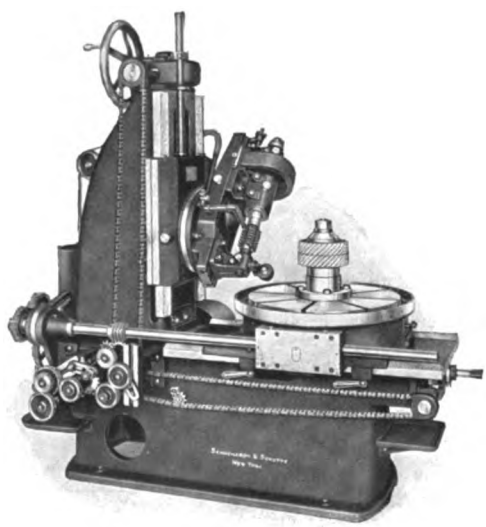

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MACHINES (Continued)

KEY SEATING MACHINES

BAKER Bros., Toledo, O. "Colburn."

BURR & Sons, John T., Brooklyn, N. Y.

COLBURN—See Baker Bros.

DAVIS Machine Co., W. P., Rochester, N. Y.

GIANT—See Mitts & Merrill.

LAPOINTE Machine Tool Co., Hudson, Mass.

MITTS & Merrill, Saginaw, Mich. "Giant."

MORTON Mfg. Co., Muskegon, Mich.

NILES-BEMENT-POND Co., New York, N. Y.

NOVELTY Iron Works, Dubuque, Ia.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

LEATHER MEASURING MACHINES

NIGHTINGALE, J. E., Danvers, Mass.

TUFTING Machine Supply Co., Chicago, Ill.

TURNER Tanning Machinery Co., Boston, Mass.

MARKING MACHINES

DWIGHT Slate Machine Co., Hartford, Conn. (See page 511.)

GORTON Machine Co., George, Racine, Wis.

MILLING MACHINES

ADAMS Co., Dubuque, Ia.

BARBER-COLMAN Co., Rockford, Ill.

BEAMAN & Smith Co., Providence, R. I.

BECKER Milling Machine Co., Hyde Park, Mass. (See page 531.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CARTER & Hakes Co., Winsted, Conn.

CHICAGO Machine Tool Co., Chicago, Ill.

CINCINNATI Milling Machine Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GARVIN Machine Co., New York, N. Y.

HENDEY Machine Co., Torrington, Conn.

INGERSOLL Milling Machine Co., Rockford, Ill.

KEARNEY & Trecker Co., Milwaukee, Wis. "Milwaukee."

KEMPSMITH Mfg. Co., Milwaukee, Wis.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

MILWAUKEE—See Kearney & Trecker Co.

NILES-BEMENT-POND Co., New York, N. Y.

OESTERLEIN Machine Co., Cincinnati, O.

OWEN Machine Tool Co., Springfield, O.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

ROCHESTER Boring Machine Co., Rochester, N. Y.

ROCKFORD Machine Tool Co., Rockford, Ill.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers). (See page 529.)

SELLERS & Co., Wm., Philadelphia, Pa.

SOUTH Bend Machine Tool Co., South Bend, Ind.

THURSTON Mfg. Co., Providence, R. I.

NUT FACING MACHINES

DETRICK & Harvey Machine Co., Baltimore, Md.

NUT-TAPPING MACHINES

ACME Machinery Co., Cleveland, O.

AUTOMATIC Machine Co., Bridgeport, Conn. "Coulter."

BROWN Co., H. B., East Hampton, Conn.

COULTER—See Automatic Machine Co.

DETRICK & Harvey Machine Co., Baltimore, Md.

HOWARD Iron Works, Buffalo, N. Y. "Schlenker."

LANDIS Machine Co., Waynesboro, Pa. (See page 473.)

LITTLE GIANT—See Wells Bros. Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

REECE Co., E. F., Greenfield, Mass.

REED Co., Francis, Worcester, Mass. (See page 513.)

SCHLENKER—See Howard Iron Works.

WELLS Bros. Co., Greenfield, Mass. (See page 561.)

PISTON RING MACHINES

(Semi Automatic)

WINDSOR Machine Co., Windsor, Vt.

POLISHING MACHINES

(See Machines, Buffing and Polishing)

PROFILING MACHINES

BECKER Milling Machine Co., Hyde Park, Mass. (See page 531.)

GARVIN Machine Co., New York, N. Y.

NILES-BEMENT-POND Co., New York N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

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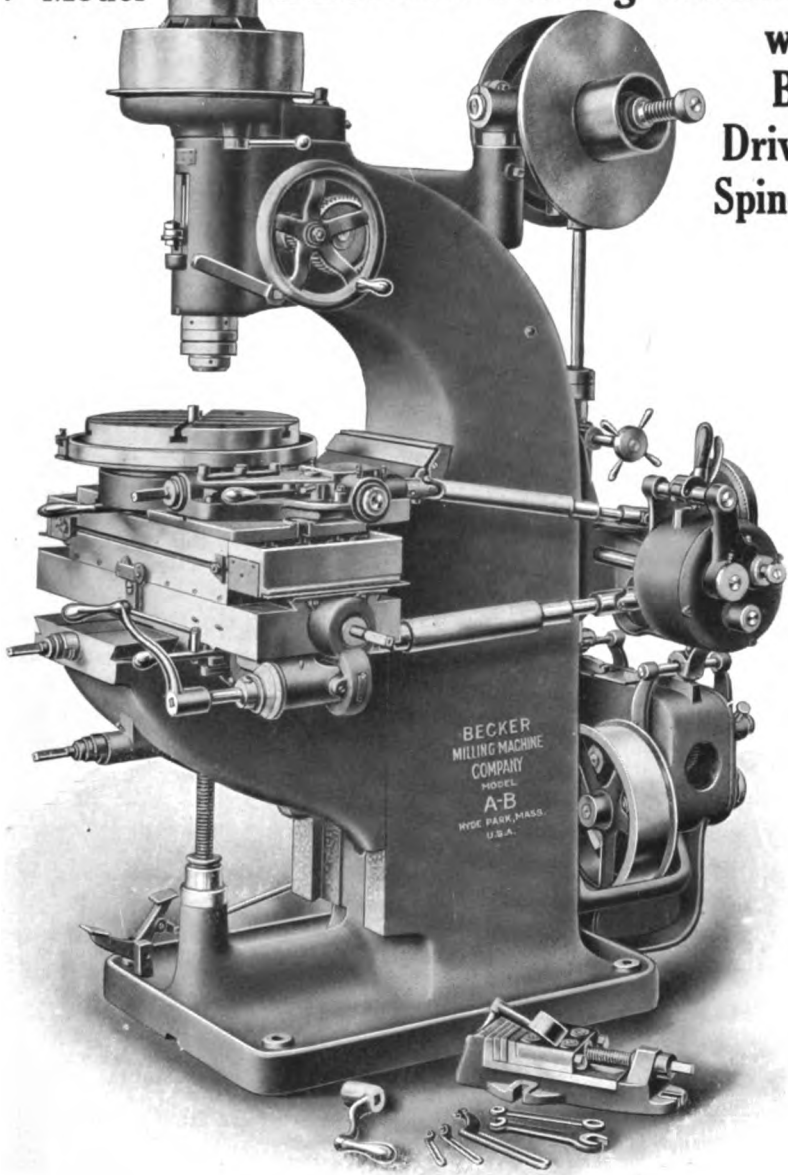
THE New Model BECKER Milling Machine with Belt Driven Spindle



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MACHINES (Continued)

RIM FORMING AND ROLLING MACHINES

BLAKE & Johnson Co., Waterbury, Conn.
(See page 367.)

RIVETING MACHINES

CINCINNATI Pulley Machinery Co., Cincinnati, O.

GRANT Mfg. & Machine Co., 100 Silliman Ave., Bridgeport, Conn.
(See page 501.)

HUBBELL, Harvey, Bridgeport, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

SHUSTER Co., F. B., New Haven, Conn.

SAND BLAST MACHINES

BETTON, J. M., New York, N. Y. "Drucklieb."

BUCKEYE—See Macleod & Co.

CURTIS & Co., Mfg. Co., St. Louis, Mo.

DRUCKLIEB—See Betton, J. M.

JORN, Jr., A., Waukegan, Ill.

MACLEOD & Co., Walter, Cincinnati, O. "Buckeye."

NICHOLS Iron Works, D. M., New York, N. Y.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y.
(See page 533.)

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. "Paxson-Warren."
(See page 533.)

PAXSON-WARREN—See Paxson Co.

TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

TOWNSEND Mfg. Co., H. P., Hartford, Conn.

SAW SHARPENING MACHINES

COCHRANE-BLY Co., Rochester, N. Y.

NUTTER & Barnes Co., Boston, Mass.

SCREW MACHINES

(Automatic)

AUTOMATIC Machine Co., Bridgeport, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CHICAGO Automatic Screw Machine Co., Chicago, Ill.

CLEVELAND Automatic Machine Co., Cleveland, O.

DAVIS Sewing Machine Co., Dayton, O.

FLANDERS Mfg. Co., Pontiac, Mich.
(See pages 123, 124 and 545.)

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

GRIDLEY—See Windsor Machine Co.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 737.)

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 365.)

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

UNIVERSAL Machine Screw Co., Hartford, Conn.

WINDSOR Machine Co., Windsor, Vt. "Gridley."

SCREW MACHINES

(Hand)

ACME Machine Tool Co., Cincinnati, O.

BARDONS & Oliver, Cleveland, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

WARNER & Swasey Co., Cleveland, O.

SPRING COILING MACHINES

BAIRD Machine Co., Oakville, Conn.

GARVIN Machine Co., New York, N. Y.

HOEFER—See Wells Co., Frank L.

WELLS Co., Frank L., Kenosha, Wis. "Hoefer."

SPRING TESTING MACHINES

COULTER & McKenzie Machine Co., Bridgeport, Conn.

TAPPING MACHINES

BAKER Bros., Toledo, O.

GARVIN Machine Co., New York, N. Y.

GRANT Mfg. & Machine Co., 100 Silliman Ave., Bridgeport, Conn.
(See page 501.)

HARTFORD Machine Screw Co., Hartford, Conn.

HUBBELL, Harvey, Bridgeport, Conn.

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

ST. Louis Machine Tool Co., St. Louis, Mo.

UPHOLSTERY BUTTON MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O.
(See page 555.)

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SAVE LABOR AND IMPROVE PRODUCT

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MACHINES (Continued)

UPHOLSTERY TUFTING MACHINES

BUSER-POSTON Tufting Machine Co., Chillicothe, O.

NOVELTY Tufting Machine Co., 1202 Michigan Ave., Chicago, Ill. (See page 701.)

WOOD BENDING MACHINES

DEFIANCE Machine Works, Defiance, O. (See page 535.)

FAY & Egan Co., J. A., Cincinnati, O.

WOOD BORING MACHINES

AJAX Mfg. Co., Allegheny, Pa.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O. (See page 535.)

FAY & Egan Co., J. A., Cincinnati, O.

FISCHER Machine Works, E., Chicago, Ill.

GREENLEE Bros. & Co., Rockford, Ill.

KANE & Roach, Syracuse, N. Y.

OBER Mfg. Co., Chagrin Falls, O.

PRYIBIL, P., New York, N. Y.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

YERKES & Finan Woodworking Machinery Co., St. Louis, Mo.

WOOD MORTISING AND TENONING MACHINES

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O. (See page 535.)

FAY & Egan Co., J. A., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

OLIVER Machinery Co., Grand Rapids, Mich.

YERKES & Finan Woodworking Machinery Co., St. Louis, Mo.

MALLETS

WOODEN MALLETS

BLISS Mfg. Co., R., Pawtucket, R. I.

DELPHOS Mfg. Co., Delphos, O.

HELLENBERG & Son, J. B., Coldwater, Mich.

PIQUA Handle & Mfg. Co., Piqua, O.

SANDUSKY Tool Co., Sandusky, O.

UNION Hardware Co., Torrington, Conn.

MANDRELS

EXPANDING MANDRELS

CHAMPION—See Western Tool & Mfg. Co.

EARLE Gear & Machine Co., Philadelphia, Pa.

LE COUNT, Wm. G., S. Norwalk, Conn.

MORSE Twist Drill & Machine Co., New Bedford, Mass. (See page 497.)

NICHOLSON & Co., W. H., Wilkes-Barre, Pa.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

METERS

CUT METERS

WARNER Instrument Co., Beloit, Wis. (See page 667.)

MICROMETERS

MICROMETER CALIPERS

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers). (See page 529.)

SLOCOMB Co., J. T., Providence, R. I.

SMITH Co., E. G., Columbia, Pa.

STARRETT Co., L. S., Athol, Mass.

MOLDS

TIRE VULCANIZING MOLDS AND CORES

BRIDGWATER Machine Co., Akron, O.

CORP Bros., Providence, R. I.

WILLIAMS Foundry & Machine Co., Ash St., Akron, O. (See page 735.)

OVENS

CORE BAKING OVENS

BLODGETT Co., G. S., Burlington, Vt.

BYRAM & Co., Detroit, Mich.

CULLEN-ATKINSON Co., Hartford, Conn.

FALLS Mfg. Co., Cuyahoga Falls, O. "Wadsworth."

HILL & Griffith Co., Cincinnati, O. (See page 479.)

MILLETT Core Oven Co., Springfield, Mass.

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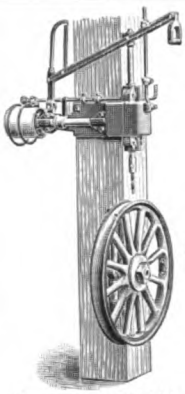
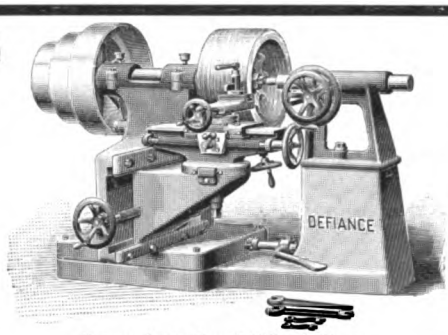
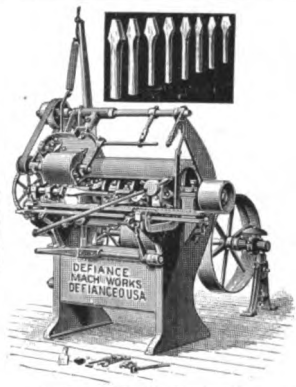


Auto Wheel Driller



Heavy Auto Truck Wheel Sizer



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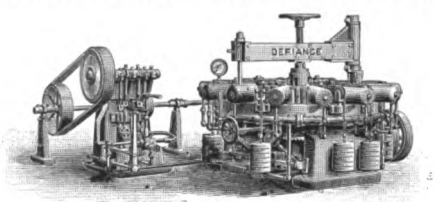

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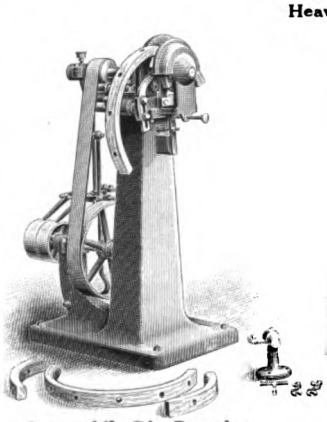
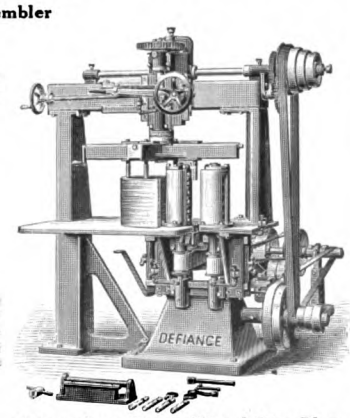


Automobile Rim Rounder

Auto Wheel Finisher



Heavy Auto Truck Wheel Rim Planer

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OVENS (Continued)

CORE BAKING OVENS (Continued)

OVEN Equipment & Mfg. Co., Stamford, Conn.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

WADSWORTH—See Falls Mfg. Co.

ENAMELING OVENS

AMERICAN Enamel Co., Providence, R. I. "Mascot."

BLODGETT Co., G. S., Burlington, Vt.

CULLEN-ATKINSON Co., Hartford, Conn.

MASCOT—See American Enamel Co.

OVEN Equipment & Mfg. Co., Stamford, Conn.

ROCKWELL Co., W. S., New York, N. Y.

STEINER, Emil E., Newark, N. J.

PAPER

EMERY AND SAND PAPER

AMERICAN Glue Co., Boston, Mass. "Union," "New England," "Boston."

BAEDER, Adamson & Co., New York, N. Y.

BEHR & Co., Herman, New York, N. Y. "Brooklyn."

BOSTON—See American Glue Co.

BROOKLYN—See Behr & Co.

CARBORUNDUM Co., Niagara Falls, N. Y. (See page 507.)

NEW ENGLAND—See American Glue Co.

UNION—See American Glue Co.

WAUSAU Sandpaper Co., Wausau, Wis.

PLANERS

METAL PLANERS

AMERICAN Tool Works Co., Cincinnati, O.

CHANDLER Planer Co., Ayer, Mass.

CINCINNATI Planer Co., Cincinnati, O.

CINCINNATI Shaper Co., Cincinnati, O.

CLEVELAND Planer Works, Cleveland, O.

DETRICK & Harvey Machine Co., Baltimore, Md.

FLATHER Planer Co., Mark, Nashua, N. H.

GRAY Co., G. A., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HARRINGTON Son & Co., Edwin, Philadelphia, Pa.

KNECHT Planer Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POWELL Tool Co., Worcester, Mass.

PUTNAM Machine Co., Fitchburg, Mass.

ROCKFORD Machine Tool Co., Rockford, Ill.

SELLERS & Co., Wm., Philadelphia, Pa.

STAPF & Co., John B., Dunkirk, N. Y.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WILSON Machine Co., W. A., Rochester, N. Y.

WOODWARD & Powell Planer Co., Worcester, Mass.

WOOD PLANERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Co., Beloit, Wis.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CONNELL & Dengler Machine Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati O.

CORDESMAN-RECHTIN Co., Cincinnati, O

CRESCENT Machine Co., Leetonia, O.

FALLS Machine Co., Sheboygan Falls, Wis. (See page 589.)

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

HERMANCE Machine Co., Williamsport, Pa.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

SCHNEIDER & Goosmann Machine Co., Cincinnati, O.

SILVER Mfg. Co., Salem, O.

SMITH Machinery Co., H. B., Smithville, N. J.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich. (See page 479.)

WHITE Co., John A., Dover, N. H.

WHITNEY & Son, Baxter D., Winchendon, Mass.

YERKES & Finan Woodworking Machine Co., St. Louis, Mo.

PLANES

WOODWORKERS PLANES

CHAPIN-STEVENS Co., Pine Meadow Conn.

GAGE Tool Co., Vineland, N. J.

MACK & Co., Rochester, N. Y.

OHIO Tool Co., Columbus, O.

SANDUSKY Tool Co., Sandusky, O.

SARGENT & Co., New Haven, Conn.

STANLEY Rule & Level Co., New Britain, Conn.

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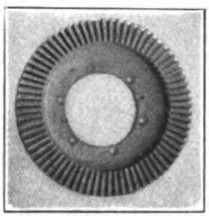

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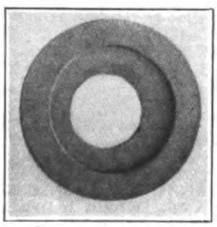

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Elastic Limit	230,000 " " " "
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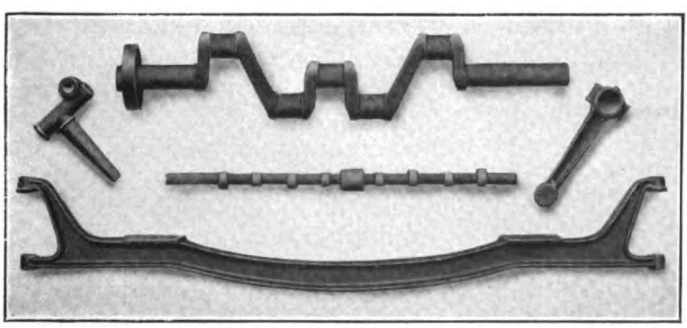

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FOUNDRY RAPPING PLATES

ACME—See Everett & Son.

BENSKIN Mfg. Co., Canton, O. "Perfect."

CLEVELAND—See Smith Foundry Supply Co.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y. "Acme." "Fraser."

FRASER—See Everett & Son.

HILL & Griffith Co., Cincinnati, O. (See page 479.)

OLIVER Machinery Co., Grand Rapids, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

SMITH Foundry Supply Co., J. D., Cleveland, O. "Cleveland."

TIMMIS & Clissold, Bound Brook, N. J.

SCREW PLATES

(See Taps and Dies)

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COMBINATION PLIERS

ATHOL Machine Co., Athol, Mass.

AUTOMATIC Specialty Co., Newark, N. J.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BERNARD—See Scholhorn Co.

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BONNER Mfg. Co., C. E., Chrisman, Ill. "Victor."

BONNEY Vise & Tool Works, Allentown, Pa.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. (See page 499.)

BUFFUM Tool Co., Louisiana, Mo.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

CRESCENT Tool Co., Jamestown, N. Y. "Simplex."

CRONK & Carrier Mfg. Co., Elmira, N. Y. (See page 539.)

DANIELSON & Co., J. P., Jamestown, N. Y.

DIXON, William, 39 John St., New York, N. Y. (See page 485.)

DUDLY Tool Co., Menominee, Mich.

ERIE Tool Works, Erie, Pa.

HALL Co., Chas. E., Buffalo, N. Y.

HARGRAVES—See Cincinnati Tool Co.

HERBRAND Co., Freemont, O.

HJORTH & Co., Wm., Jamestown, N. Y.

JOHNSON, Wm., Newark, N. J.

KILBORN & Bishop Co., New Haven, Conn.

KING & Co., J. M., Waterford, N. Y.

KNIGHT Combination Tool Co., New Haven, Conn.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J. "U. S."

MESNARDS—See Modern Sales Bureau.

MODERN Sales Bureau, Chicago, Ill. "Mesnards."

OSWEGO Tool Co., Oswego, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

REED Mfg. Co., Erie, Pa.

S. & I. Co., Springfield, Mass.

SCHOLHORN Co., Wm., New Haven, Conn. "Bernard."

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers). (See page 529.)

SIMPLEX—See Crescent Tool Co.

U. S.—See Lowentraut Mfg. Co.

UTICA Drop Forge & Tool Co., Utica, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VICTOR—See Bonner Mfg. Co.

VLCHEK Tool Co., Cleveland, O. (See page 481.)

GAS PLIERS

(See Pliers, Combination)

POSTS

TOOL POSTS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

PRESSES

ARBOR PRESSES

BARNES Co., W. F. & John, Rockford, Ill.

BARTLETT, E. E., 320 A St., Boston, Mass. "Greenerd." (See page 539.)

CHAMBERSBURG Engineering Co., Chambersburg, Pa.

CLEVELAND Machine Specialty Co., Cleveland, O.

GEIER Co., P. A., Cleveland, O.

GREENERD—See Bartlett, E. E.

KING Machine Tool Co., Cincinnati, O.

LUCAS Machine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

WILMARTH & Morman Co., Grand Rapids, Mich.

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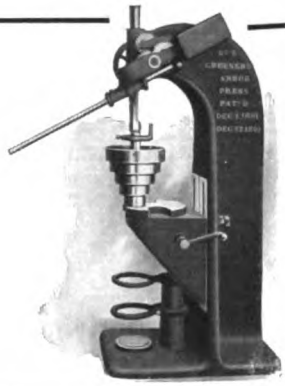

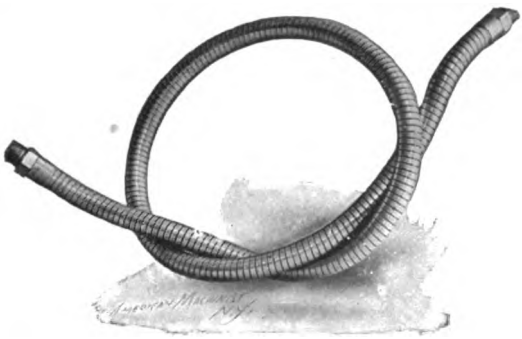

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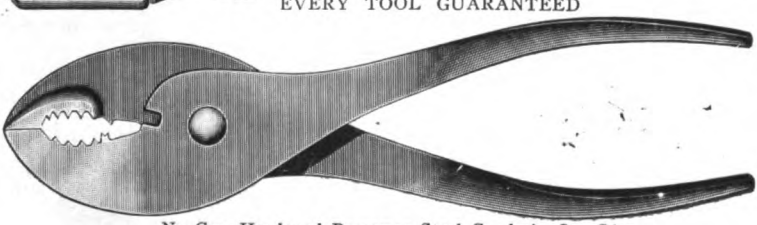

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BROACHING PRESSES

BLISS Co., E. W., Brooklyn, N. Y.

BURR & Sons, J. T., Brooklyn, N. Y.

LAPOINTE Machine Tool Co., Hudson, Mass.
(See page 541.)

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PERKINS Machine Co., Warren, Mass.

STANDARD Machinery Co., Providence, R. I.

WATSON-STILLMAN Co., New York, N. Y.

POWER PRESSES

ADRIANCE Machine Works, Brooklyn, N. Y.

ALLIANCE Machine Co., Alliance, O.

AMERICAN Can Co., Chicago, Ill.

ATLAS Machine Co., Waterbury, Conn.

BAIRD Machine Co., Oakville, Conn.

BLAKE & Johnson Co., Waterbury, Conn.
(See page 367.)

BLISS Co., E. W., Brooklyn, N. Y.

CADY Machine Co., Cleveland, O.

CLEVELAND Punch & Shear Works, Cleveland, O.

CONSOLIDATED Press & Tool Co., Hastings, Mich.

COULTER & McKenzie Machine Co., Bridgeport, Conn.

FERRACUTE Machine Co., Bridgeton, N. J.

HIBBARD Mfg. Co., Wm. H., Brooklyn, N. Y.

LA SALLE Machine & Tool Co., La Salle, Ill.

LEFFLER & Co., Chas., Brooklyn, N. Y.

LONG & Allstatter Co., Hamilton, O.

MANVILLE Bros. Co., Waterbury, Conn.

MANVILLE Machine Co., E. J., Waterbury, Conn.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

ROCKFORD Iron Works, Rockford, Ill.

ROWBOTTOM Machine Co., Waterbury, Conn.
(See page 519.)

SPRINGFIELD Machine Tool Co., Springfield, O.

STALL Mfg. Co., D. H., Buffalo, N. Y.

STANDARD Machinery Co., Providence, R. I.

SWAINE Mfg. Co., Fred J., St. Louis, Mo.

TOLEDO Machine & Tool Co., Toledo, O.

V. & O. Press Co., Glendale, N. Y.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WATERBURY Machine Co., Waterbury, Conn.

PULLERS

COTTER PIN PULLERS

AUTO Spring Repairer Co., 123 Liberty St., New York, N. Y.
(See page 197.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

ELMORE Tool Mfg. Co., Hartford, Conn.

HALL Co., Chas. E., Buffalo, N. Y.

KRAEUTER & Co., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MOSSBERG Co., Frank, Attleboro, Mass.

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo.
(See page 481.)

NOONAN Tool & Machine Works, A. S., Rome, N. Y.

S. & I. Co., Springfield, Mass.

VLCHEK Tool Co., Cleveland, O.
(See page 481.)

CRANK PIN OR FLYWHEEL PULLERS

CRANE Puller Co., Boston, Mass.

KERSCHBAUM, M. E., New York, N. Y.

SCHWEPPE & Wilt, Detroit, Mich.

WEEBER Mfg. Works, C. F., Albany, N. Y.

PUMPS

GARAGE PUMPS AND AIR COMPRESSORS

ALLIS-CHALMERS Co., Milwaukee, Wis.

AMERICAN Steam Pump Co., Battle Creek, Mich.

ARTIZAN Brass Co., Chicago, Ill.

AUTO Electrical Mfg. Co., Chicago, Ill. "Excel."

BAIRD Machine & Mfg. Co., Detroit, Mich. "Yale."

BERGSTROM, Oscar M., Minneapolis, Minn. "O. B."

BESSEMER Gas Engine Co., Grove City, Pa.

BISHOP-BABCOCK-BECKER Co., Cleveland, O. "Eureka."

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BROWN Beer Pump Co., E. R., Boston, Mass. "Success."

BRUNNER Mfg. Co., Utica, N. Y. "Parker."

BURY Compressor Co., Erie, Pa.

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

CHAMPION—See Cleveland Faucet Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill.
(See page 49.)

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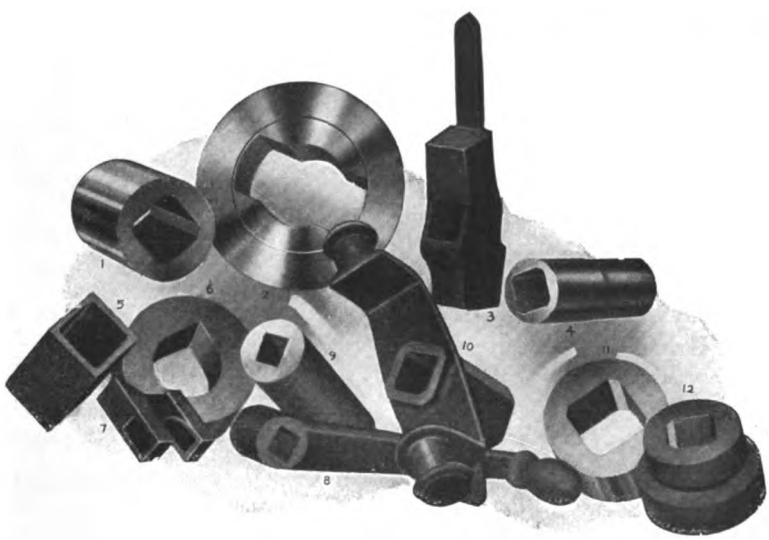

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CLEVELAND Faucet Co., Cleveland, O. "Champion."

COMSTOCK, A. S., Evanston, Ill.

CROWELL, J. Gilmer, Brooklyn, N. Y.

CYCLONE—See Judd & Leland Mfg. Co.

DAL Mfg. Co., Chicago, Ill.

EUREKA—See Bishop-Babcock-Becker Co.

EXCEL—See Auto Electrical Mfg. Co.

FAIRBANKS, Morse & Co., Chicago, Ill.

FLICKINGER Iron Works, Bradford, Pa.

FT. WAYNE Engineering & Mfg. Co., Ft. Wayne, Ind. "Paul."

FULMER, C. F., Plainfield, N. J.

GARDNER Governor Co., Quincy, Ill.

GLEASON-PETERS Air Pump Co., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich. (See page 543.)

GOULDS Mfg. Co., Seneca Falls, N. Y.

HERZ & Co., Puck Bldg., New York, N. Y. "Minimax." (See page 335.)

IMPERIAL—See Ingersoll-Rand Co.

INGERSOLL-RAND Co., 11 Broadway, New York, N. Y. "Imperial." (See page 563.)

INTERNATIONAL Steam Pump Co., New York, N. Y. "Clayton."

JACOBSON Machine Mfg. Co., Warren, Pa. (See page 225.)

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Cyclone." (See page 339.)

KELLOGG Mfg. Co., Rochester, N. Y.

LACKAWANNA Mfg. Co., New York, N. Y.

LITTLE GIANT—See Orange Machine & Mfg. Co.

LIQUID Carbonic Co., 432 Wells St., Chicago, Ill. (See page 417.)

MARTIN & Anson Co., Chicago, Ill.

MINIMAX—See Herz & Co.

NATIONAL Brake & Electric Co., Milwaukee, Wis.

O. B.—See Bergstrom, Oscar M.

ORANGE Machine & Mfg. Co., Orange, N. J. "Little Giant."

OSWALD Co., C. J., Grand Rapids, Mich.

PARKER—See Brunner Mfg. Co.

PAUL—See Ft. Wayne Engineering & Mfg. Co.

PHILADELPHIA Timer & Machine Co., 51st St. & Lancaster Ave., Philadelphia, Pa. (See page 413.)

SARGENT Steam Meter Co., Chicago, Ill.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 313.)

STANDARD Pattern & Mfg. Co., Richmond, Ind.

SUCCESS—See Brown Beer Pump Co.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill. (See page 499.)

UNION Steam Pump Co., Battle Creek, Mich.

VICTOR Electric Co., Chicago, Ill.

WESTINGHOUSE Air Brake Co., Pittsburg, Pa.

YALE—See Baird Machine & Mfg. Co.

PUNCHES

PUNCHES AND SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BICKWELL Mfg. & Supply Co., Janesville, Wis.

BLISS Co., E. W., Brooklyn, N. Y.

BUFFALO Forge Co., Buffalo, N. Y.

CINCINNATI Punch & Shear Co., Cincinnati, O.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

CLARK Foundry Co., Rumford, Me.

EXCELSIOR Tool & Machine Co., E. St. Louis, Ill.

FERRACUTE Machine Co., Bridgeton, N. J.

HILLES & Jones Co., Wilmington, Del.

KANE & Roach, Syracuse, N. Y.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

LONG & Allstatter Co., Hamilton, O.

MITTS & Merrill, Saginaw, Mich.

MOLINE—See Williams, White & Co.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERKINS Machine Co., Warren, Mass.

QUEEN City Punch & Shear Co., Cincinnati, O.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

ROCK River Machine Co., Janesville, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

TOLEDO Machine & Tool Co., Toledo, O.

WHITING Co., Geo., Chicago, Ill.

WILLIAMS, White & Co., Moline, Ill. "Moline."

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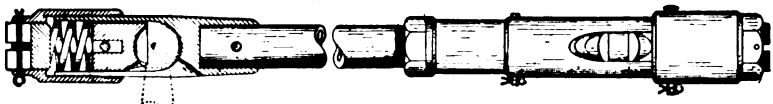

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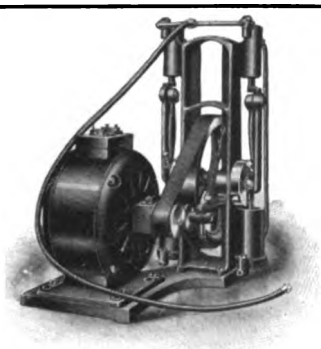

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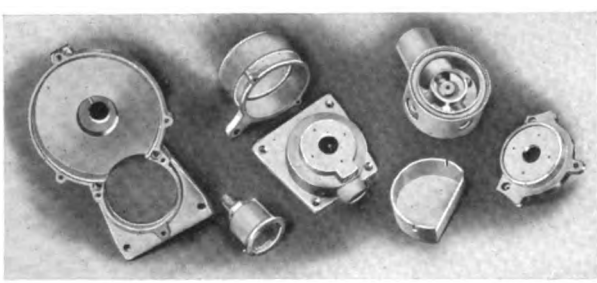

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PUNCHES (Continued)

CENTER AND PRICK PUNCHES

BEALL Bros., Alton, Ill.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

CARVER Tool Works, Spring Valley, N. Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y. (See page 539.)

DEUSE, J. S., Chester, Conn.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

JOHNSON, Wm., Newark, N. J.

KEYSTONE Mfg. Co., Buffalo, N. Y. (See page 571.)

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MAYHEW Co., H. H., Shelburne Falls, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

PORTABLE HAND PUNCHES

AMERICAN Lock Nut Co., Oregon, Ill. "Lightning."

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

BUFFALO Forge Co., Buffalo, N. Y.

EVANSVILLE Tool Works, Evansville, Ind.

EXCELSIOR Tool & Machine Co., E. St. Louis, Ill. "Little Giant."

GEM Tool Works, Brooklyn, N. Y. "Sampson."

KIDDER Mfg. Co., J. F., Burlington, Vt.

LIGHTNING—See American Lock Nut Co.

LITTLE GIANT—See Excelsior Tool & Machine Co.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

MARVEL—See Armstrong-Blum Mfg. Co.

QUEEN City Punch & Shear Co., Cincinnati, O.

SAMPSON—See Gem Tool Works.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

WHITNEY Mfg. Co., W. A., Rockford, Ill.

PRICK PUNCHES

(See Punches, Center and Prick)

WASHER PUNCHES

(See Punches, Arch and Washer)

PYROMETERS

ADVANCE—See Wilson-Maeulen Co.

AMERICAN Steam Gauge & Valve Mfg. Co., Boston, Mass.

BRISTOL Co., New York, N. Y.

BROWN Instrument Co., 311 Walnut St., Philadelphia, Pa.

BROWN & Son, Edward, Philadelphia, Pa

DU VIVIER, Ernest H., New York, N. Y. (Importer.)

ESTERLINE Co., LaFayette, Ind.

HOSKINS Mfg. Co., Detroit, Mich.

LE CHATELIER—See Wilson-Maeulen Co

LEEDS & Northrop Co., 4901 Stanton Ave., Philadelphia, Pa.

QUEEN Co., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

TAYLOR Instrument Cos., Rochester, N. Y "Tycos."

THWING, C. B., Philadelphia, Pa.

TYCOS—See Taylor Instrument Cos.

UEHLING Instrument Co., Passaic, N. J.

WILSON-MAEULEN Co., New York, N. Y "Advance," "Le Chatelier."

ZAUBITZ, August, New York, N. Y.

RACKS

METAL TOOL AND STOCK RACKS

CLARK Co., W. J., Salem, O.

DARBY & Sons Co., Edward, Philadelphia, Pa.

DURAND Steel Locker Co., Chicago, Ill.

FEDERAL Steel Fixture Co., Chicago, Ill.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MERRITT & Co., Camden, N. J.

NEW Britain Machine Co., New Britain, Conn.

OHIO Mfg. Co., Painesville, O.

TERRELL'S Equipment Co., Grand Rapids, Mich.

VAN Dorn Iron Works, Cleveland, O.

REAMERS

STANDARD AND ADJUSTABLE REAMERS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BRUBAKER & Bros., W. L., Millersburg Pa.

CELFOR Tool Co., Chicago, Ill.

CLOUGH, R. M., Tolland, Conn.

CLEVELAND Twist Drill Co., Cleveland, O "Paradox," "Peerless."

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 493.)

DIAMOND—See Whitman & Barnes Mfg Co.

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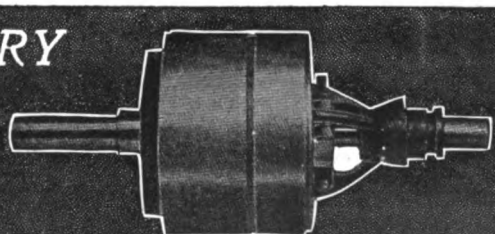

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REAMERS (Continued)

STANDARD AND ADJUSTABLE REAMERS (Continued)

GISHOLT Machine Co., Madison, Wis.

GRANT Nail & Supply Co., Boston, Mass. "Turney."

HERCULES—See Reece Co.

KELLY Reamer Co., Cleveland, O.

LAPOINTE Machine Tool Co., Hudson, Mass.
(See page 541.)

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

McCROSKY Reamer Co., Meadville, Pa.

MEYER Reamer Co., Cleveland, O.

MORSE Twist Drill & Machine Co., New Bedford, Mass.
(See page 497.)

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

ONE Lock Reamer Co., New Haven, Conn.

PARADOX—See Cleveland Twist Drill Co.

PEERLESS—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

REECE Co., E. F., Greenfield, Mass. "Hercules."

ROGERS Works, John M., Gloucester City, N. J.

SCHELLENBACK-HUNT Tool Co., Cincinnati, O.

STANDARD Tool Co., Cleveland, O.

STAPF & Co., John B., Dunkirk, N. Y.

TURNEY—See Grant Nail & Supply Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."
(See page 561.)

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

REGISTERS

AUTOGRAPHIC AND MANIFOLD REGISTERS

AUTOGRAPHIC Register Co., Hoboken, N. J.

CARTER-CRUME Co., Niagara Falls, N. Y.
(See page 549.)

EGRY Register Co., Dayton, O.
(See page 549.)

McCASKEY Register Co., Alliance, O.

RIDDLES

FOUNDRY RIDDLES AND SIEVES

BUFFALO Wire Works Co., Buffalo, N. Y.

DARBY & Sons Co., Edward, Philadelphia, Pa.

DEAN & Co., Hy. E., Worcester, Mass.

TAYLOR & Dean, Pittsburg, Pa.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

ROLLS

BENDING AND STRAIGHTENING ROLLS

ATLAS Machine Co., Waterbury, Conn.

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

CINCINNATI Punch & Shear Co., Cincinnati, O.

KANE & Roach, Syracuse, N. Y.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

PETTINGELL Machine Co., Amesbury, Mass.

QUEEN City Punch & Shear Co., Cincinnati, O.

ROCK River Machine Co., Janesville, Wis.

WHITING Co., Geo., Chicago, Ill.

RULES

STEEL RULES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

KEUFFEL & Esser Co., Hoboken, N. J.

LUFKIN Rule Co., Saginaw, Mich.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

SANDERS

WOOD SANDERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Co., Beloit, Wis.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DRIVER, C. H., Racine, Wis.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PRYIBIL, P., New York, N. Y.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, 18-22 Campau St., Grand Rapids, Mich.
(See page 479.)

WHITE Co., John A., Dover, N. H.

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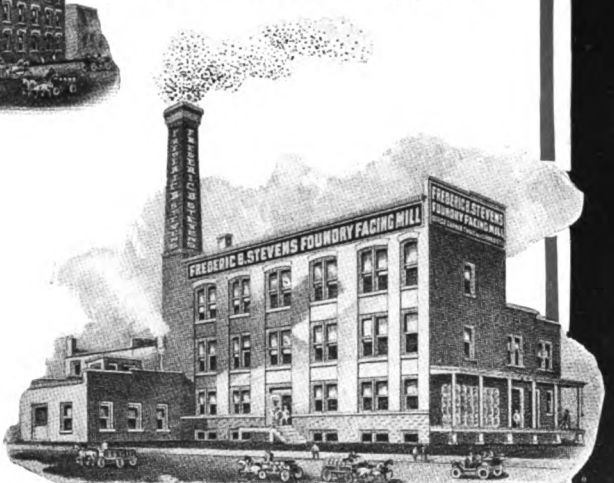

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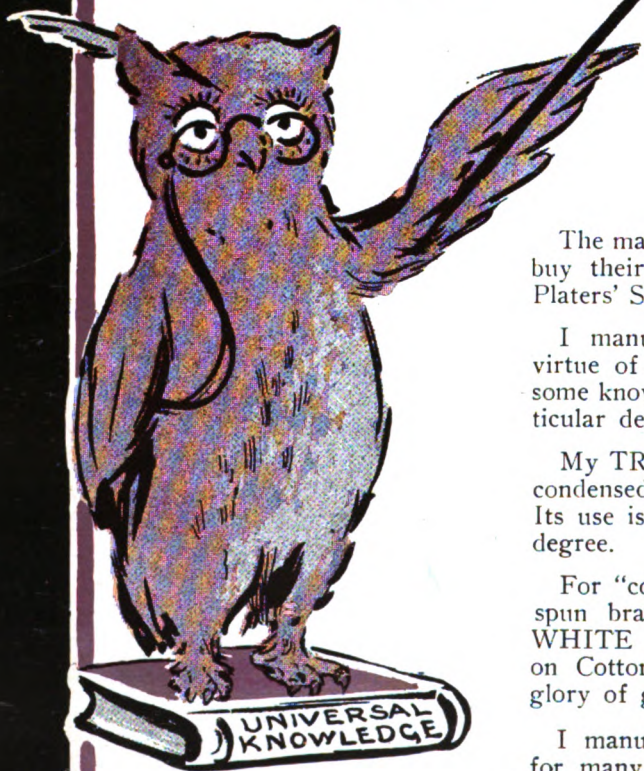

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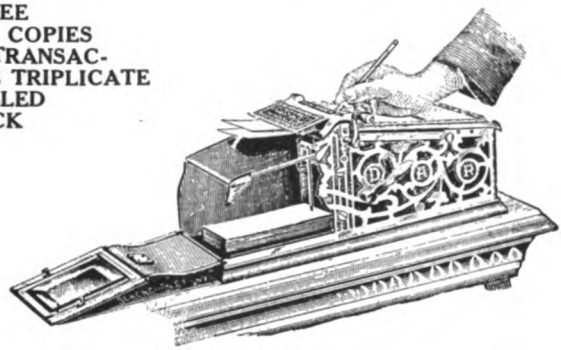

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AMERICAN Saw Mill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Co., Beloit, Wis.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GOODSPEED Machine Co., Winchendon, Mass.

GREAVES, Klusman & Co., Cincinnati, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

HILES & Co., C. A., Chicago, Ill.

KANE & ROACH, Syracuse, N. Y.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

PRYIBIL, P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

WHITE Co., John A., Dover, N. H.

CIRCULAR SAW TABLES

AMERICAN Saw Mill Machinery Co., Hackettstown, N. J.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BAKER Bros., Toledo, O.

BEACH Mfg. Co., Montrose, Pa.

BENTEL & Margendant Co., Hamilton, O.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HAYES Machine Co., Kingston, N. Y.

HEMINGWAY & Son, John, Lynn, Mass.

HERMANCE Machine Co., Williamsport, Pa.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

U. S. Machine Co., Williamsport, Pa.

YERKES & Finan Woodworking Machine Co., St. Louis, Mo.

COLD SAW CUTTING-OFF MACHINES

AMERICAN Die & Tool Co., Reading, Pa.

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BURKE Machinery Co., Conneaut, O.

BURR & Sons, John T., Brooklyn, N. Y.

COCHRANE-BLY Co., Rochester, N. Y.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

HIGLEY Machine Co., New York, N. Y.

LEA Equipment Co., New York, N. Y. "Lea-Simplex."

LEA-SIMPLEX—See Lea Equipment Co.

MOTOR Parts Co., Plainfield, N. J. (See page 557.)

NEWTON Machine Tool Works, Philadelphia, Pa.

NUTTER & Barnes Co., Boston, Mass.

TINDEL-MORRIS Co., Eddystone, Pa.

WILMARTH & Morman Co., Grand Rapids Mich.

HAND SAWS

(Rip and Cross Cut)

ATKINS & Co., E. C., Indianapolis, Ind.

BISHOP & Co., Geo. H., Lawrenceburg Ind.

CENTRAL Hardware Co., Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

JENNINGS & Co., C. E., New York, N. Y.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass.

POWER HACK SAWS

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

ATKINS & Co., E. C., Indianapolis, Ind. "Kwik-Kut."

BUFFALO Specialty Co., Buffalo, N. Y. "Duplex."

CLEVELAND Block Co., Cleveland, O.

DAYTON Machine Works, Dayton, O. "Victor."

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DUPLEX—See Buffalo Specialty Co.

FRONTIER Iron Works, Buffalo, N. Y. "Robertson's Royal."

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

HOEFER Mfg. Co., Freeport, Ill.

KWIK-KUT—See Atkins & Co.

MARVEL—See Armstrong-Blum Mfg. Co.

MASSACHUSETTS Saw Works, Chicopee Mass.

MILLER'S Falls Co., New York, N. Y.

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SAWS (Continued)

POWER HACK SAWS (Continued)

MOTOR Parts Co., Plainfield, N. J. (See page 557.)

RACINE Tool & Machine Co., Racine, Wis.

ROBERTSON Mfg. Co., Buffalo, N. Y.

ROBERTSON'S ROYAL—See Frontier Iron Works.

STAR—See Miller's Falls Co.

STERLING—See Diamond Saw & Stamping Works.

STORY, H. T., Chicago, Ill.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNIVERSAL—See West Haven Mfg. Co.

VICTOR—See Dayton Machine Works.

WEST Haven Mfg. Co., New Haven, Conn. "Universal."

SWING SAWS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BADGER State Machine Co., Janesville, Wis.

BERLIN Machine Co., Beloit, Wis.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CONNELL & Dengler Machine Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

FISHER Machine Works, E., Chicago, Ill.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

HERMANCE Machine Co., Williamsport, Pa.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

U. S. Machine Co., Williamsport, Pa.

WHITE Co., John A., Dover, N. H.

YERKES & Finan Woodworking Machinery Co., St. Louis, Mo.

HOT SAWS

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

HILES & Co., C. A., Chicago, Ill.

LEWIS Foundry & Machine Co., Pittsburg, Pa.

INSERTED TOOTH SAWS

BARRY Saw Co., Indianapolis, Ind.

BUCKEYE Saw Mfg. Co., Columbus, O.

DISSTON & Sons, Henry, Philadelphia, Pa. "Royal," "Monarch," "Premier."

MONARCH—See Disston & Sons.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

PREMIER—See Disston & Sons.

ROYAL—See Disston & Sons.

SIMONDS Mfg. Co., Fitchburg, Mass.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor-Newbold."

TAYLOR-NEWBOLD—See Tabor Mfg. Co.

TINDEL-MORRIS Co., Eddystone, Pa.

SCRAPERS

BEARING SCRAPERS

B. & R.—See Beckley-Ralston Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "B. & R." (See page 159.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

ESSEX—See S. B. R. Specialty Co.

KRAEUTER & Co., Newark, N. J.

LUTZ—See Western Tool & Mfg. Co.

MARCY Tool Works, Putnam, Conn.

MOUND Tool & Scraper Co., 1606-08 N. Broadway, St. Louis, Mo. (See page 481.)

POORMAN Co., J. E., Philadelphia, Pa.

S. B. R. Specialty Co., E. Orange, N. J. "Essex." (See page 451.)

WESTERN Tool & Mfg. Co., Springfield, O. "Lutz."

SCRIBERS

MACHINISTS SCRIBERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

JOHNSON, Wm., Newark, N. J.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

SEPARATORS

AIR SEPARATORS

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

OIL SEPARATORS

AMERICAN Tool & Machine Co., Boston, Mass. "Roper." (See page 553.)

NATIONAL SEPARATOR & Machine Co., Boston, Mass.

ROPER—See American Tool & Machine Co.

Complete Index to Classification appears on Pages 8 to 22.

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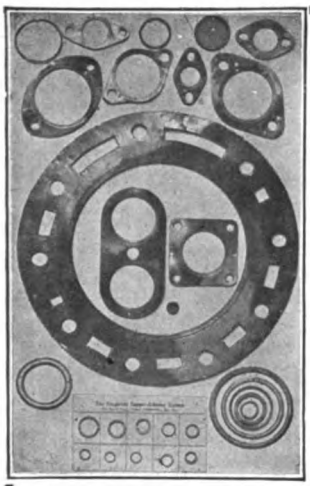

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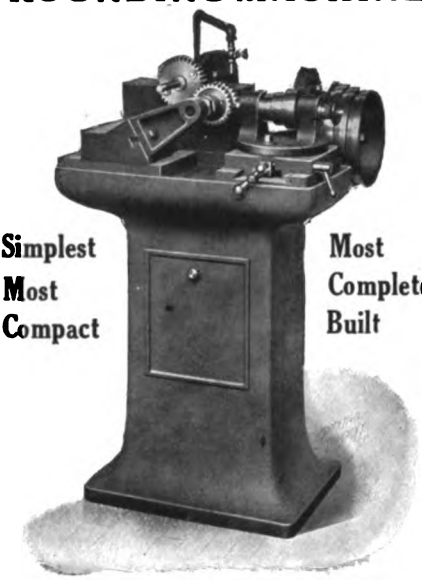

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CARVER Tool Works, Spring Valley, N. Y.

DREW & Co., C., Kingston, N. Y.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

SHAPERS

METAL SHAPERS

AMERICAN Tool Works Co., Cincinnati, O.

BARKER & Co., Wm., Cincinnati, O.

BOYNTON & Plummer, Worcester, Mass.

CINCINNATI Shaper Co., Cincinnati, O.

FLATHER Planer Co., Mark, Nashua, N. H.

GOULD & Eberhardt, Newark, N. J.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

JUENGST & Sons, Geo., Croton Falls, N. Y.

KELLY Co., R. A., Xenia, O.

LUTTER & Gies, Milwaukee, Wis. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POTTER & Johnston Machine Co., Pawtucket, R. I.

QUEEN City Machine Tool Co., Cincinnati, O.

ROCKFORD Machine Tool Co., Rockford, Ill.

SELLERS & Co., Wm., Philadelphia, Pa.

SMITH & Mills Co., Cincinnati, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

STEPTOE Shaper Co., John, Cincinnati, O.

STOCKBRIDGE Machine Co., Worcester, Mass.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WOOD SHAPERS

ADVANCE Machinery Co., 517-19 Hamilton St., Toledo, O. (See page 517.)

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Co., Beloit, Wis.

COLLADAY Co., Jos. O., Philadelphia, Pa.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

PRYIBIL, P., New York, N. Y.

SMITH Machine Co., H. B., Smithville, N. J.

WHITNEY & Son, Baxter D., Winchendon, Mass.

SHARPENERS

FILE SHARPENERS

AMERICAN File Sharpener Co., New York, N. Y.

SHAVES

SPOKE SHAVES

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

CINCINNATI Tool Co., Norwood, O. "Hargraves."

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

HARGRAVES—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

OHIO Tool Co., Columbus, O.

STANLEY Rule & Level Co., New Britain, Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

SHEARS

LEVER SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BICKWELL Mfg. & Supply Co., Janesville, Wis.

FARREL Foundry & Machine Co., Ansonia, Conn.

HILLES & Jones Co., Wilmington, Del.

LANSING Machine Co., Lansing, Mich.

NATIONAL Machinery Co., Tiffin, O.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NOVELTY Iron Works, Dubuque, Ia.

PECK, Stow & Wilcox Co., Southington, Conn.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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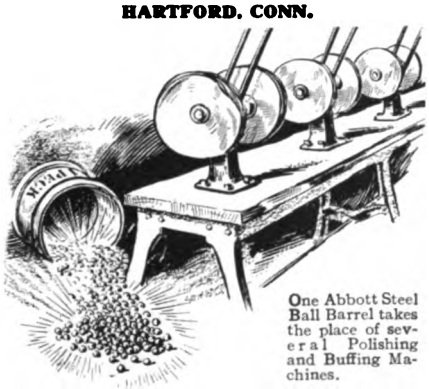
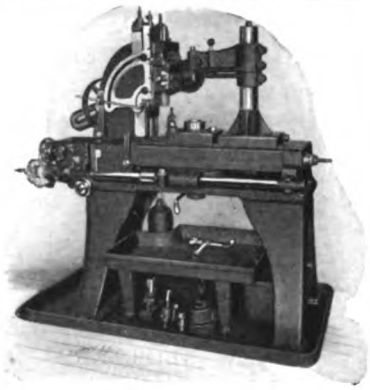
ABBOTT BURNISHING BALLS

The **ABBOTT** Burnishing process for small metal articles by means of steel balls is quicker, cheaper and produces better results than the old method of polishing.
The finished product by the Abbott method is of finer quality and it does away with the laborious method of handling individual pieces. Write for our illustrated booklet, describing this process in detail.

THE ABBOTT BALL CO.
HARTFORD, CONN.



One Abbott Steel Ball Barrel takes the place of several Polishing and Buffing Machines.



THE WHITON
Automatic Gear Cutter
FOR SPURS AND BEVELS

Special features for
ACCURATE TIMING GEARS
Write for particulars

The D. E. WHITON MACHINE CO.
New London, Conn., U. S. A.

Auto Top Fabrics

Buttons
Burlap
Buckram
Cotton
Duck
Hair
Moss
Tacks
Nails

Mohair Mackintosh
Brazil Leather, Leather Welt, Clinch Buttons
Reed Mouldings, Clinch Button Washers

G. H. Lounsbery & Sons
CINCINNATI, OHIO

Pat. Groover or Dado Head.

DISCS
FOR
Automobile Clutches
Milling Saws

Manufactured from special and high speed steel

Huther Saw Works
Rochester, N. Y.

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SHOVELS

MOLDERS SHOVELS

AMES Sons, Oliver, North Easton, Mass.

BEALL Bros., Alton, Ill.

PFEIFER & Co., John, Philadelphia, Pa.

PITTSBURG Shovel Co., Pittsburg, Pa.

WOOD Shovel & Tool Co., Piqua, O.

SLOTTERS

SCREW SLOTTERS

DAVIS Sewing Machine Co., Dayton, O.

GARVIN Machine Co., New York, N. Y.

GRANT Mfg. & Machine Co., 100 Silliman Ave., Bridgeport, Conn. (See page 501.)

MANVILLE Machine Co., E. J., Waterbury, Conn.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 365.)

TAYLOR & Fenn Co., Hartford, Conn.

SNIPS

METAL SNIPS OR SHEARS

ACME Shear Co., Bridgeport, Conn. "Ajax," "Star."

AJAX—See Acme Shear Co.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. (See page 499.)

CLAUSS Shear Co., Fremont, O.

DETROIT Shear Co., Detroit, Mich.

DUDLY Tool Co., Menominee, Mich.

HEINISCH'S Sons Co., R., Newark, N. J.

NATIONAL Cutlery Co., Philadelphia, Pa.

PECK, Stow & Wilcox Co., Southington, Conn.

STAR—See Acme Shear Co.

STORTZ & Son, John, Philadelphia, Pa.

WISS & Sons Co., J., Newark, N. J.

SOLDER

ALUMINUM SOLDER

ALUMINUM Solder Co. of Boston, Boston, Mass.

ALUMINUM Solder & Refining Co., Oswego, N. Y. "Alumnite."

ALUMINUM Tinning & Soldering Co., Springfield, Mass.

ALUMNITE—See Aluminum Solder & Refining Co.

ARROW—See Lester Co.

CITY Brass Foundry Co., Cleveland, O. (See page 683.)

CLEVELAND Block Co., Cleveland, O.

CLUM & Atkinson, Rochester, N. Y. (See page 281.)

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Richards." (See page 657.)

KOKOMO Aluminum Solder Co., Kokomo, Ind.

LANGSENKAMP, F. H., 134 E. Georgia St., Indianapolis, Ind. (See page 665.)

LESTER Co., Fayetteville, N. Y. "Arrow."

LUMEN Bearing Co., Buffalo, N. Y. (See pages 273 and 274.)

REINHOLD Noflux Aluminum Solder Co., Newark, N. J.

RICHARDS—See Janney, Steinmetz & Co.

THWING, C. B., Philadelphia, Pa.

U. S. Reduction Co., Chicago, Ill. "W. H. F."

W. H. F.—See U. S. Reduction Co.

WILDES Son, Thomas, New York, N. Y.

HALF AND HALF SOLDER

BIRKENSTEIN & Sons, S., 377-409 Ontario St., Chicago, Ill. (See page 479.)

BLATCHFORD Co., E. W., Chicago, Ill.

COLUMBIA Smelting & Refining Works, Brooklyn, N. Y.

EMPIRE Metal Co., Syracuse, N. Y.

ERIE White Metal Co., Erie, Pa.

GARDINER Metal Co., Chicago, Ill.

HOYT Metal Co., St. Louis, Mo.

LUMEN Bearing Co., Buffalo, N. Y. (See pages 273 and 274.)

MERCHANT & Evans Co., Philadelphia, Pa.

MORE-JONES Brass & Metal Co., St. Louis, Mo.

NATIONAL Lead Co., 111 Broadway, New York, N. Y. (See page 551.)

TAYLOR Co., N. & G., Philadelphia, Pa.

U. S. Reduction Co., Chicago, Ill.

WILDES Son, Thomas, New York, N. Y.

SQUARES

MACHINISTS SQUARES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SARGENT & Co., New Haven, Conn.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

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The Superior Wrench

ALWAYS READY

"NO MONKEYING"—NO ADJUSTING

"The harder you pull the tighter it grips"

Made in 5 sizes

6 inch, opens $\frac{7}{8}$ inch....**$0.50**
9 inch, opens $1\frac{1}{8}$ inch.... **0.75**
12 inch, opens $1\frac{1}{2}$ inch.... **1.00**
16 inch, opens 2 inch.... **1.25**
20 inch, opens $2\frac{1}{2}$ inch.... **1.50**

Write for our circular

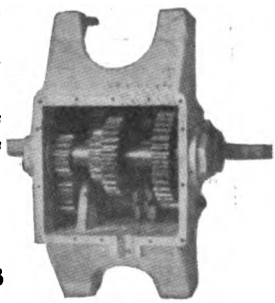
SUPERIOR WRENCH CO.

3d AVE. and MAY ST., MARSHALLTOWN, IOWA

Selective Type Transmission Gears
Planetary Transmission Gears
Control Levers
Steering and Differential Gears
Rear Axles and Jack Shafts

Send for blueprints and estimates

ALL WORK GUARANTEED



Murray Machine Works

1924 Wabansia Ave., cor. Winchester CHICAGO, ILL.

TRADE MARK REG. U. S. PAT. OFF.

THE AUTO-CLE SOCKET WRENCH

Large Set $10.00
Small Set 7.50

THE BEST DEALER'S PROPOSITION FOR 1911

Cuts for Catalog furnished

CHAMPION

Ratchet Wrench

—NEW—

Covers Practically the Whole Wrench Field.

A larger and more complete set than ever.
The sockets fit all sizes of nuts, bolts, set screws, lag screws, etc.
The CHAMPION NEVER BATTERS OR ROUNDS THEM.
Valuable where countersunk nuts or bolts are used.
Finished in nickel. Packed in Varnished Hardwood Box.

SYRACUSE WRENCH CO.

SYRACUSE, N. Y.

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STAMPS

STEEL STAMPS

(For numbering or lettering parts.)

BALZER Co., Gus., New York, N. Y.

CHANDLER Co., Springfield, Mass.

DIXON, William, 39 John St., New York, N. Y. (See page 485.)

EVERETT & Son., A., Auburn, N. Y.

HANSON, C. H., Chicago, Ill.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

KAUTZ & Co., Fred C., Chicago, Ill.

MURDOCK, Jr., Co., Jas., Cincinnati, O.

NESS, Jr., Geo. M., New York, N. Y.

NEW York Stencil Works, New York, N. Y.

NOBLE & Westbrook, Hartford, Conn.

QUINT'S Sons Co., S. H., Philadelphia, Pa.

ROBBINS Mfg. Co., John, Boston, Mass.

SACKMAN Mfg. Co., Akron, O.

SCHWERDTLE Stamp Co., Bridgeport, Conn.

STANDS

PORTABLE TOOL STANDS

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 735.)

WESTERN Tool & Mfg. Co., Springfield, O.

STOCKS

DIE STOCKS

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 561.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BAY State Tap & Die Co, Mansfield, Mass.

BESLY & Co., Chas. H., Chicago, Ill. (See page 491.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

CARD Mfg. Co., S. W., Mansfield, Mass. "Diamond."

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CONANT & Donelson Co., Conway, Mass. "Reliable."

DIAMOND—See Card Mfg. Co.

DUPLEX—See Hart Mfg. Co.

ECONOMY—See Wells & Son Co.

HART Mfg. Co., Cleveland, O. "Duplex."

HOLROYD & Co., Waterford, N. Y.

KING & Co., J. M., Waterford, N. Y.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

REECE Co., E. F., Greenfield, Mass.

RELIABLE—See Conant & Donelson.

THISTLE—See Winter Bros. Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

WELLS & Son Co., F. E., Greenfield, Mass. "Economy."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

WINTER Bros. Co., Wrentham, Mass. "Thistle."

STONES

RUBBING STONES

AMERICAN Stone Co., Floyds Knobs, Ind.

CONSOLIDATED Chemical Co., Chicago, Ill.

EUREKA Rubbing Stone Co., Chicago, Ill.

RHODES & Co., J. H., Chicago, Ill. (Importers.)

RODRIQUEZ, R. E., New York, N. Y. (Importer.)

THURSTON Co., F. W., Chicago, Ill. (Importers.)

WADDELL & Co., R. J., New York, N. Y. (Importers.)

WADSWORTH, Howland & Co., Boston, Mass.

STOOLS

STEEL STOOLS

KALAMAZOO Steel Goods Co., Kalamazoo, Mich. (See page 559.)

NEW Britain Machine Co., New Britain, Conn.

SUPPLIES

FOUNDRY SUPPLIES

BRASS Founders Supply Co., Newark, N. J.

DETROIT Foundry Supply Co., Detroit, Mich.

HILL & Griffith Co., Cincinnati, O. (See page 479.)

NATIONAL Supply Co., Philadelphia, Pa.

OBERMAYER Co., S., Cincinnati, O.

OSBORN Co., J. M. & L. A., Cleveland, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 533.)

SMITH Foundry Supply Co., J. D., Cleveland, O.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. (See pages 547 and 548.)

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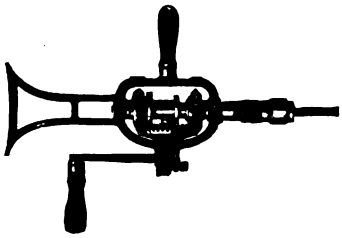
Leaky Valves Mean Poor Compression



You can't have tight valves unless they are ground right.

The only device which will grind your valves properly without manual skill and without great labor is the

Ashcroft Combination Valve Grinder

Will grind valve in about half the time that the same work can be done by present methods using a bit brace.

It can also, by a slight adjustment, be used as a breast drill or ratchet for removal of pins, screws, etc., in inaccessible places.

If your dealer hasn't this tool in stock or won't get one—write us.

The Ashcroft Manufacturing Co.

85-87-89 Liberty St., New York.
111-115 North Canal St., Chicago.

Price, $6.00 net

Sockets cover Cap Screws 5/16" to L", Nuts ¼" to ⅜", A. L. A. M. 5/16" to ⅜".

Contains Ratchet Wrench, Extension Bar, Universal Joint, and Fifteen Sockets.

In handsome leather box.

The best wrench and the only ratchet wrench for Tire Lugs, Dust Caps and Spark Plugs. All sizes.

WALDEN MFG. CO.

69 Beacon St. Worcester, Mass.

FACTORY STOOLS AND CHAIRS

ANGLE STEEL FRAMES
HARDWOOD SEATS

RIVETED JOINTS
(Braces reinforced by Electric Welded Steel Ring).

"The Everlasting Kind."

Never Need Replacing

The First Cost Is Final One

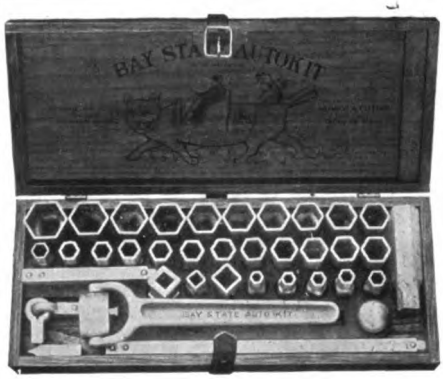
Sample Stools Sent on Approval

Express Prepaid

Ask for Catalog No. 11

KALAMAZOO STEEL GOODS CO.

KALAMAZOO, MICHIGAN



Bay State Autokit

will reach any nut on any car. Heavy reversible ratchet. White nickel finish. Neat, mahogany finished case.

Made in two sizes.

$10.00—$7.50

WRITE FOR CIRCULARS

GEO. A. CUTTER, Sales Agent
Taunton, Mass.

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SUPPLIES (Continued)

MACHINE SHOP, GARAGE AND FACTORY SUPPLIES

(This is a list of Dealers in Machine Shop, Garage and Factory Supplies who advertise in this publication.)

DIXON, William, 39 John St., New York, N. Y.
(See page 485.)

FRASSE & Co., Peter A., 130-32 Worth St., New York, N. Y.
(See page 447.)

SWAGES

TOP AND BOTTOM SWAGES

(See Fullers and Swages)

SYSTEMS

SAND BLAST SYSTEMS

PANGBORN Co., Thos. W., 93 West St., New York, N. Y.
(See page 533.)

TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

TANKS

CHEMICAL FIRE TANKS

ACCURATE—See Tea Tray Co.

TEA Tray Co., Newark, N. J. "Accurate."

TAPES

MEASURING TAPES

KEUFFEL & Esser Co., Hoboken, N. J.

LUFKIN Rule Co., Saginaw, Mich.

STARRETT Co., L. S., Athol, Mass.

TAPS

TAPS AND DIES

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine."
(See page 561.)

BAY State Tap & Die Co., Mansfield, Mass.

BESLY & Co., Chas. H., Chicago, Ill. "Helmet."
(See page 491.)

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt. "Derby."

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Twist Drill Co., Cleveland, O.

CONANT & Donelson Co., Conway, Mass. "Reliable."

DERBY—See Butterfield & Co.

HELMET—See Besly & Co.

HERCULES—See Reece Co.

HOLROYD & Co., Waterford, N. Y.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.
(See page 497.)

PRATT & Whitney Co., Hartford, Conn.
(See page 471.)

REECE Co., E. F., Greenfield, Mass. "Hercules."

RELIABLE—See Conant & Donelson.

REMINGTON Tool & Machine Co., Boston, Mass.

SMART Mfg. Co., A. J., Greenfield, Mass.

STANDARD Tool Co., Cleveland, O.

SUPERIOR Tap Co., Charlestown, N. H.

THISTLE—See Winter Bros. Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."
(See page 561.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."

WINTER Bros. Co., Wrentham, Mass. "Thistle."

TOOLS

DEALERS IN TOOLS

This is a list of Dealers in Tools who advertise in this publication.)

DIXON, William, 39 John St., New York, N. Y.
(See page 485.)

FRASSE & Co., Peter A., 130-32 Worth St., New York, N. Y.
(See page 447.)

LATHE AND PLANER TOOLS

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

CELFOR Tool Co., Chicago, Ill.

CHAMPION—See Western Tool & Mfg. Co.

HILL Standard Mfg. Co., Anderson, Ind.

JOHNSON—See Pratt & Whitney Co.

MARCY Tool Works, Putnam, Conn.

O. K. Tool Holder Co., Shelton, Conn.

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Little Giant. —A. L. A. M.— Little Giant.

STANDARD SCREW PLATES

ASSORTMENT No. 305
Stock 14½ in. long. Adjustable Tap Wrench No. 5
Plug Taps . Dies Collets 2" diam.
A. L. A. M. Standard Sizes and Pitches
Cutting ¼-28 5/16-24, ⅜-24, 7/16-20, ½-20 $12.00

ASSORTMENT No. 306
Stock 26 in. long Adjustable Tap Wrench No. 7
Plug Taps Dies Collets 2¾" diam.
A. L. A. M. Standard Sizes and Pitches
Cutting 9/16-18, ⅝-18, 11/16-16, ¾-16, ⅞-14, 1-14 $22.00

WRITE FOR CATALOG 22-T

WELLS BROTHERS COMPANY, Greenfield, Mass., U.S.A.

Little Giant. NEW YORK CHICAGO LONDON Little Giant.

THREADING TOOLS
A. L. A. M. STANDARD

AUTOMOBILE SCREW PLATES

MACHINE SCREW, HAND AND NUT TAPS AND DIES FOR MANUFACTURERS

Send for Catalogue and Discounts

AMERICAN TAP & DIE CO., Greenfield, Mass.

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TOOLS (Continued)

LATHE AND PLANER TOOLS (Continued)

PRATT & Whitney Co., Hartford, Conn. (See pages 471.)

RHODES—See Pratt & Whitney Co.

STORTZ & Son, John, Philadelphia, Pa.

THOMPSON & Son Co., Henry G., New Haven, Conn.

WESTERN Tool & Mfg. Co., Springfield, O "Champion."

WOODBRIDGE—See Pratt & Whitney Co.

MOLDERS TOOLS

BARNETT Foundry Co., Oscar, Newark, N. J.

BURR'S Damascus Tool Works, Detroit, Mich.

DOBSON, Wm., Canastota, N. Y.

MONK, Chas., Brooklyn, N. Y.

PENINSULAR Tool & Specialty Co., Detroit, Mich.

PLANER TOOLS

(See Tools, Lathe and Planer)

PNEUMATIC TOOLS

BLISS Co., E. W., Brooklyn, N. Y.

CHICAGO Pneumatic Tool Co., Chicago, Ill. (See page 49.)

CLEVELAND Pneumatic Tool Co., Cleveland, O.

DAYTON Pneumatic Tool Co., Dayton, O.

DUNLAP Engineering Co., Columbus, O. (See page 595.)

HELWIG Mfg. Co., St. Paul, Minn.

INDEPENDENT Pneumatic Tool Co., Chicago, Ill.

INGERSOLL-RAND Co., 11 Broadway, New York, N. Y. (See page 563.)

MONARCH—See Standard Railway Equipment Co.

OLDHAM & Son Co., George, Philadelphia, Pa.

PANGBORN Co., Thos. W., 93 West St., New York, N. Y. (See page 533.)

PITTSBURG Pneumatic Co., Canton, O.

STANDARD Railway Equipment Co., E. St. Louis, Ill. "Monarch."

THREADING TOOLS

BOSTON Tool Co., Cambridge, Mass.

GEOMETRIC Tool Co., New Haven, Conn.

MODERN Tool Co., Erie, Pa.

RIVETT Lathe Mfg. Co., Boston, Mass.

TORCHES

GASOLINE TORCHES AND FURNACES

AMERICAN Stove Co. (Ringen Div.), St Louis, Mo.

BEST Light Co., Canton, O.

BRIDGEPORT Brass Co., 126 Crescent Ave., Bridgeport, Conn. (See page 337.)

CLAYTON & Lambert Mfg. Co., Detroit, Mich.

HAUCK Mfg. Co., Brooklyn, N. Y.

HULL Mfg. Co., J. S., Baltimore, Md.

KNAPP Mfg. Co., New York, N. Y.

QUADRIGA Mfg. Co., Chicago, Ill. "Walters."

SCHNEIDER & Trenkamp Co., Cleveland, O.

TURNER Brass Works, Sycamore, Ill.

VOLCANO Torch & Mfg. Co., Erie, Pa.

WALL Mfg. Supply Co., P., Pittsburg, Pa.

WALTERS—See Quadriga Mfg. Co.

WELLINGTON Mfg. Co., New York, N. Y.

TRAMMELS

TRAMMEL POINTS

GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

SAWYER Tool Mfg. Co., Fitchburg, Mass.

STARRETT Co., L. S., Athol, Mass.

TRIMMERS

WOOD TRIMMERS

(Hand Power)

FOX Machine Co., Grand Rapids, Mich.

OLIVER Machinery Co., Grand Rapids, Mich.

VISES

DRILL PRESS VISES

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BOWN Machine Co., Battle Creek, Mich.

CARTER & Hakes Co., Winsted, Conn.

GRAHAM Mfg. Co., Providence, R. I.

HILL Standard Mfg. Co., Anderson, Ind.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

HOPKINSON Machine Works, Springfield, Mass.

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PNEUMATIC TOOLS

BUILT TO WEAR; NOT MERELY TO SELL

We could probably build a "cheaper" tool than anyone in the business—but that is not the policy which has built up our reputation.

Ingersoll-Rand Pneumatic Tools are built for the satisfaction of the user—not merely for our own profit.

We believe that there is actually more service in our Pneumatic Tools than in any others.

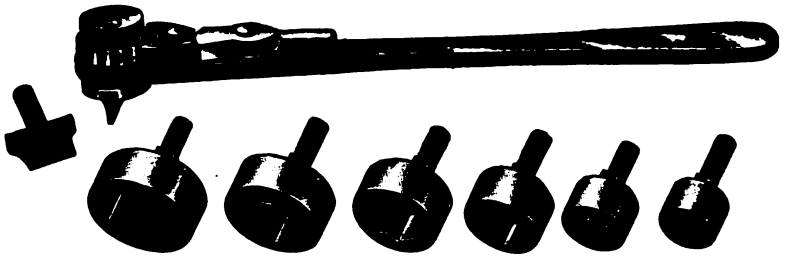
And probably this means more in Pneumatic Tools than in any other class of machine. It is equally true of Ingersoll-Rand Compressors and Air Hoists.

INGERSOLL-RAND CO.
11 Broadway, NEW YORK

Offices in all principal cities of the world

LANE'S RATCHET SCREW DRIVER AND WRENCH

Length, 7 inches. Weight of complete set, 1 pound



5/8-inch. 9/16-inch, 1/2-inch, 7/16-inch, 3/4-inch, 5/16-inch
Openings to Fit Cap and Set Screw Heads.

THIS tool is a combination of a Screw Driver and a Wrench for use in close quarters. It is made of the very best material, very strong, and light in action, and quickly changed from right to left. The Wrench Socket openings are made so that each will take either hexagon or square nuts, and the different Wrench Sockets and Screw Driver Bits are easily and quickly interchanged by unscrewing the knurled cap at top. (See cut.)

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LITTLE GIANT—See Noyes Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

NOYES Co., B. B., Greenfield, Mass. "Little Giant."

PLUNKET, J. E., Chicago, Ill.

SKINNER Chuck Co., New Britain, Conn.

TITUS Machine Works, Marion, O.

HAND VISES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

LOWELL Wrench Co., Worcester, Mass.

MILLER'S Falls Co., New York, N. Y.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

SMITH, Otis A., Rockfall, Conn.

SMITH & Hemenway Co., New York, N. Y.

MACHINISTS VISES

ANCHOR—See Prentiss Vise Co.

ATHOL Machine Co., Athol, Mass.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

BARRETT Machine Tool Co., Meadville, Pa.

BONNEY Vise & Tool Works, Allentown, Pa.

BULL DOG—See Prentiss Vise Co.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger."

ERIE Tool Works, Erie, Pa.

FISHER-BROOKS—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Fisher-Brooks."
(See page 565.)

FULTON Machine & Vise Co., Lowville, N. Y.

HOLLANDS Mfg. Co., Erie, Pa.

HOWARD Iron Works, Buffalo, N. Y.

JACKSON Vise & Tool Co., New York, N. Y.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Clincher," "Perfect," "Lightning."

MERRILL Bros., Maspeth, N. Y.

MONARCH—See Prentiss Vise Co.

PARKER Co., Chas., Meriden, Conn.
(See page 565.)

PERFECT—See Massey Vise Co.

PHOENIX Hardware Mfg. Co., Homer, N. Y.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Anchor," "Bull Dog," "Monarch," "Rapid Transit."

RAPID Transit—See Prentiss Vise Co.

REED Mfg. Co., Erie, Pa.

ROCK Island Mfg. Co., Rock Island, Ill.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.)
(See page 529.)

TIGER—See Emmert Mfg. Co.

YOST Mfg. Co., G. M., Meadville, Pa.

MILLING MACHINE VISES

CARTER & Hakes Co., Winsted, Conn.

HENDEY Machine Co., Torrington, Conn.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

PATTERN MAKERS AND WOOD-WORKERS VISES

ABERNATHY Vise & Tool Co., Chicago, Ill.

ATHOL Machine Co., Athol, Mass.

AYES & Co., Chicago, Ill.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass. "Chandler & Washburn."

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BLAKE—See Prentiss Vise Co.

BONNEY Vise & Tool Works, Allentown, Pa.

CHANDLER & WASHBURN—See Barbour-Stockwell Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa.

FISHER-BROOKS—See Fisher & Norris

FISHER & Norris, Trenton, N. J. "Fisher-Brooks."
(See page 565.)

HOLLANDS Mfg. Co., Erie, Pa.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

OLIVER Machinery Co., Grand Rapids, Mich.

PARKER Co., Chas., Meriden, Conn.
(See page 565.)

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Blake."

ROCK Island Mfg. Co., Rock Island, Ill.

SHELDON & Co., E. H., Chicago, Ill.

TOLES Co., W. C., Chicago, Ill.

VAN Buren Tool Co., Van Buren, Ind.

WALKER Machine Co., G. A., Boston, Mass.

PIN VISES

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

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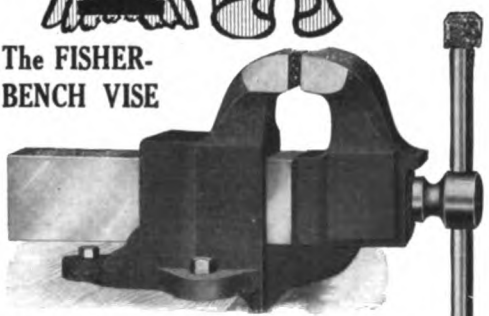

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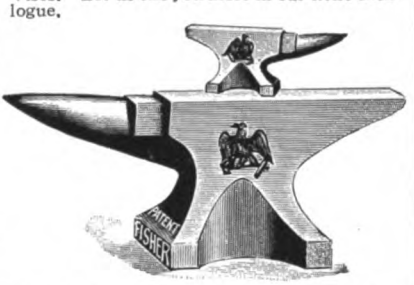

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GOODELL-PRATT Co., Greenfield, Mass. (See page 473.)

KOCH & Sons, A. S., Lancaster, Pa.

LOWELL Wrench Co., Worcester, Mass.

STARRETT Co., L. S., Athol, Mass.

PIPE VISES

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BONNEY Vise & Tool Works, Allentown, Pa.

EMMERT Mfg. Co., Waynesboro, Pa.

ERIE Tool Works, Erie, Pa.

FISHER-BROOKS—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Fisher-Brooks." (See page 565.)

HOLLANDS Mfg. Co., Erie, Pa.

LORD Co., L. L., Meadville, Pa. "Mead."

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill. "Perfect."

MEAD—See Lord Co.

ORANGE Machine & Mfg. Co., Orange, N. J.

OSWEGO Tool Co., Oswego, N. Y.

PARKER Co., Chas., Meriden, Conn. (See page 565.)

PERFECT—See Massey Vise Co.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y.

REED Mfg. Co., Erie, Pa.

ROCK Island Mfg. Co., Rock Island, Ill.

SAUNDERS Sons, D., Yonkers, N. Y.

SCHUCHARDT & Schutte, 90 West St., New York, N. Y. (Importers.) (See page 529.)

WALWORTH Mfg. Co., Boston, Mass. (See page 571.)

WELLS & Son Co., F. E., Greenfield, Mass.

YOST Mfg. Co., G. M., Meadville, Pa.

PLANER VISES

BROWN & Sharpe Mfg. Co., Providence, R. I.

HENDEY Machine Co., Torrington, Conn.

HILL Standard Mfg. Co., Anderson, Ind.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill." Lightning."

PRATT & Whitney Co., Hartford, Conn. (See page 471.)

SPECIAL AND PORTABLE VISES

BONNEY Vise & Tool Works, Allentown, Pa.

F. & R.—See Fulton Machine & Vise Co.

FULTON Machine & Vise Co., Lowville, N. Y. "F. & R."

NEW BANNER—See Newhall Chain Forge & Iron Co.

NEWHALL Chain Forge & Iron Co., New York, N. Y. "New Banner."

PARKER Co., Chas., Meriden, Conn. (See page 565.)

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

ROCK Island Mfg. Co., Rock Island, Ill.

WOODWORKERS VISES

(See Vises, Patternmakers and Woodworkers)

WAYS

BALANCING WAYS

BOWSHER Co., N. P., S. Bend, Ind.

DEFIANCE Machine Works, Defiance, O. (See page 535.)

ROCKFORD Tool Co., Rockford, Ill.

WHEELS

BUFFING AND POLISHING WHEELS

CHICAGO Wheel & Mfg. Co., Chicago, Ill.

DIXON, William, 39 John St., New York, N. Y. (See page 485.)

DIVINE Bros. Co., Utica, N. Y.

EASTERN Felt Co., Winchester, Mass.

EASTERN Polishing Supply Co., Easton, Pa

FOOT Mfg. Co., Jersey City, N. J.

KORTUM Mfg. Co., Buffalo, N. Y.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. (See pages 547 and 548.)

CARBORUNDUM AND CORUNDUM WHEELS

AMERICAN Emery Wheel Works, Providence, R. I.

BAY State Emery Wheel Co., Worcester, Mass.

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

BUFFALO Emery Wheel Co., Buffalo, N. Y

CARBORUNDUM Co., Niagara Falls, N. Y. (See page 507.)

CORTLAND Corundum Wheel Co., Cortland, N. Y.

MONARCH Grinding Wheel Co., Camden, N. J.

NATIONAL Corundum Wheel Co., Buffalo, N. Y.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

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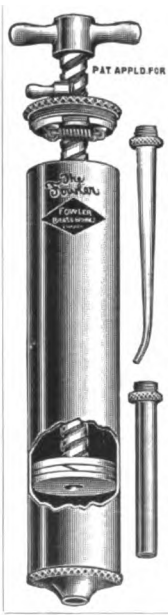

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VITRIFIED Wheel Co., Westfield, Mass.

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ELECTRIC Emery Wheel Co., Newark, N. J.

MONARCH Grinding Wheel Co., Camden, N. J.

NATIONAL Corundum Wheel Co., Buffalo, N. Y.

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AUTO QUEEN—See C. M. B. Wrench Co.

BARNES Tool Co., New Haven, Conn.

BAY STATE AUTOKIT—See Cutter, Geo. A.

BECCO—See Beck Co.

BECK Co., Rockville Centre, N. Y. "Becco." (See page 163.)

BEMIS & Call Hardware & Tool Co., Springfield, Mass.

BETTCHER Mfg. Co., Cleveland, O. (See page 625.)

BILLINGS & Spencer Co., Hartford, Conn. (See pages 191 and 192.)

BONNEY Vise & Tool Works, Allentown, Pa.

BOSSERT Co., Utica, N. Y. (See page 755.)

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. (See page 499.)

BUCKEYE—See Lamson & Sessions Co.

BURKLEY Supply Co., New York, N. Y. "Twingrip."

C. M. B. Wrench Co., Syracuse, N. Y. "Silver King." "Auto Queen."

CHAMPION—See Syracuse Wrench Co.

COES Wrench Co., Worcester, Mass.

CONVERTIBLE Ratchet Wrench Co., Allentown, Pa.

CRESCENT Tool Co., Jamestown, N. Y.

CRONK & Carrier Mfg. Co., Elmira, N. Y. (See page 539.)

CUTTER, Geo. A., Taunton, Mass. "Bay State Autokit." "Stickit." (See page 559.)

DIAMOND—See Mossberg Co.

DUDLY Tool Co., Menominee, Mich.

EAMES Tool Co., Lynn, Mass.

ELLIS—See Offset Handle Wrench Co.

EMPIRE—See Hjorth & Co.

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

EWER Wrench & Tool Mfg. Co., Howell, Mich. (See page 569.)

FERRET—See Pedersen Lubricator Co.

GARAGE Equipment Mfg. Co., 742 S. Pierce St., Milwaukee, Wis. "Gem." (See page 283.)

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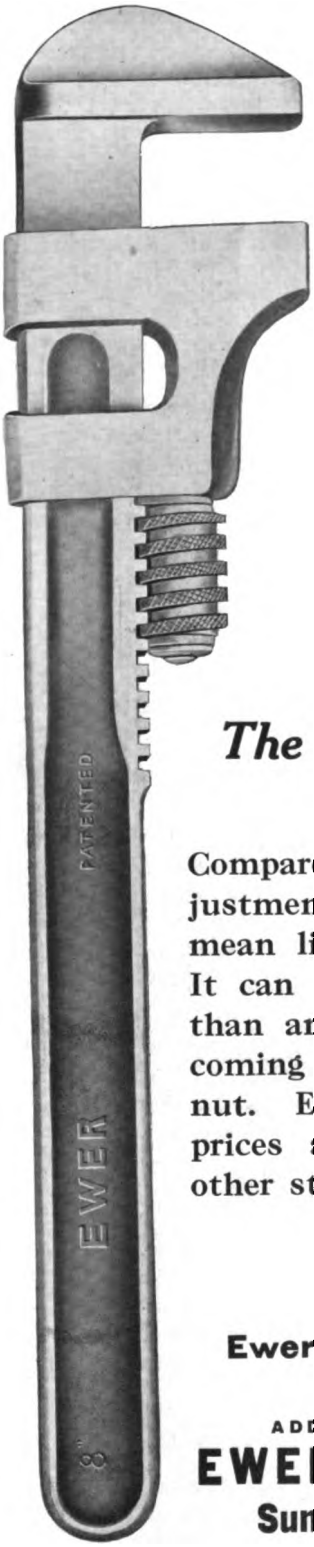

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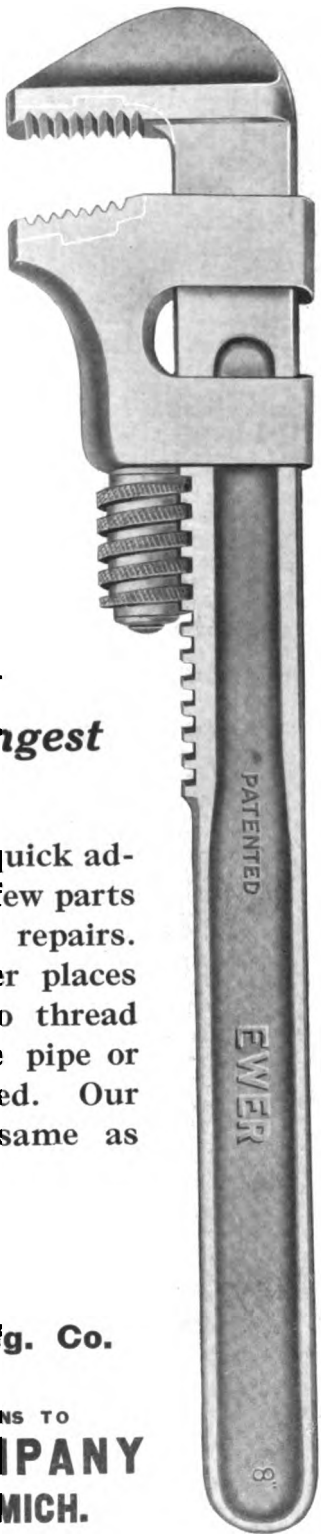

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GUERNSEY Wrench Co., Lawrence, Mass.

HALL Co., Chas. E., Buffalo, N. Y.

HARRIS & Reed Mfg. Co., Chicago, Ill.

HAWKEYE Wrench Co., Marshalltown, Ia.

HERBRAND Co., Fremont, Ohio.

HJORTH & Co., Wm., Jamestown, N. Y. "Empire," "Lightning."

INDIANAPOLIS Drop Forging Co., Indianapolis, Ind.

KEYSTONE Drop Forge Works, Chester, Pa.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Westcott." (See page 571.)

KILBORN & Bishop Co., New Haven, Conn. "Saxon."

LAKESIDE Forge & Wrench Co., Erie, Pa.

LAMSON & Sessions Co., Cleveland, O. "Buckeye."

LANES—See McCarty & Co.

LEVER Co., Newark, N. J.

LIGHTNING—See Hjorth & Co.

LITTLE GIANT—See Wells Bros. Co.

LITTLE PALS—See Victor Tool Works.

LONG Wrench Co., J. R., Akron, O. "Quick."

LOWELL Wrench Co., Worcester, Mass.

LOWENTRAUT Mfg. Co., P., Newark, N. J. "U. S."

McCARTY & Co., J. C., 21 Murray St., New York, N. Y. "Lanes." (See page 563.)

MAC-KAE Mfg. Co., 185 Amory St. (Jamaica Plain), Boston, Mass. (See page 631.)

MONTE Wrench Co., Shelbyville, Ind.

MOORE Drop Forging Co., Springfield, Mass.

MOSSBERG Co., Frank, Attleboro, Mass. "Sterling." "Diamond." "Alderman." "Na-

MOTOR Parts Co., Plainfield, N. J. "Auto-Cle," "Titus-Cle." (See page 557.)

NATIONAL—See Mossberg Co.

NEW Britain Mfg. Co., New Britain, Conn. "Pick-Up."

NEW England Forge Co., Worcester, Mass.

OFFSET Handle Wrench Co., Holland, Mich. "Ellis."

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

PEDERSEN Lubricator Co., 636-44 First Ave., New York, N. Y "Ferrett." (See page 267.)

PERFECT HANDLE—See Smith & Co.

PERFECTION Tool & Accessory Co., 1777 Broadway, New York, N. Y. "Rex." (See page 487.)

PERPETUAL—See American Flyer Mfg. Co.

PICK-UP—See New Britain Mfg. Co.

QUICK—See Long Wrench Co.

REX—See Perfection Tool & Accessory Co.

REX Wrench Co., 200 Summer St., Boston, Mass. (See page 571.)

RICHARDS Mfg. Co., Aurora, Ill. "Wizard."

ROEBLINGS Sons Co., John A., Trenton, N. J.

RONSON Specialty Co., Newark, N. J.

SAXON—See Kilborn & Bishop Co.

SILVER KING—See C. M. B. Wrench Co.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SMITH & Heminway, New York, N. Y.

STERLING—See Mossberg Co.

STICKIT—See Cutter, Geo. A.

SUPERIOR Wrench Co., Third Ave. & May St., Marshalltown, Ia. (See page 557.)

SYRACUSE Wrench Co., Syracuse, N. Y. "Champion," "Yala." (See page 557.)

TITUS-CLE—See Motor Parts Co.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo." (See page 573.)

TWINGRIP—See Burkley Supply Co.

U. S.—See Lowentraut Mfg. Co.

UNIVERSAL—See American Flyer Mfg. Co

VICTOR Tool Works, Detroit, Mich. "Little Pals."

VLCHEK Tool Co., Cleveland, O. (See page 481.)

WAKEFIELD, Clarence E., Worcester, Mass.

WALDEN Mfg. Co., 63 Beacon St., Worcester, Mass. (See page 559.)

WELLS Bros. Co., Greenfield, Mass. "Little Giant." (See page 561.)

WESCOTT—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, Ohio.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

WIZARD—See Richards Mfg. Co.

WORCESTER Pressed Steel Co., Worcester, Mass.

WRIGHT Wrench & Forging Co., 1424 Barth St., Canton, O. (See page 573.)

YALA—See Syracuse Wrench Co.

YEMCO—See York Electric & Machine Co

YORK Electric & Machine Co., York, Pa "Yemco."

PIPE WRENCHES

AJAX Wrench Co., Toledo, Ohio.

ARMSTRONG Mfg. Co., Bridgeport, Conn.

AUTO-DOC—See New Metal Tool Steel Co.

BONNER Mfg. Co., C. E., Chrisman, Ill "Victor."

BONNEY Vise & Tool Co., Allentown, Pa.

CRESCENT Forgings Co., Oakmont, Pa. "Cresco."

CRESCO—See Crescent Forgings Co.

DUDLY Tool Co., Menominee, Mich.

EMPIRE—See Hjorth & Co.

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PIPE WRENCHES (Continued)

ERIE Tool Works, Erie, Pa.

EWER Wrench & Tool Mfg. Co., Howell, Mich.
(See page 569.)

HAWKEYE Wrench Co., Marshalltown, Ia.

HJORTH & Co., Wm., Jamestown, N. Y. "Empire."

IRLAND Pipe Wrench Co., Boston, Mass.

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 657.)

KEYSTONE Mfg. Co., Buffalo, N. Y. "Wescott."
(See page 571.)

KILBORN & Bishop Co., New Haven, Conn.

LEADER—See Ripley Pipe Wrench Co.

MOORE Drop Forging Co., Springfield, Mass.

NEW Metal Tool Steel Co., Portland, Me. "Auto-Doc."

OSWEGO Tool Co., Oswego, N. Y.

RIPLEY Pipe Wrench Co., Ripley, N. Y. "Leader."

ROCHESTER Drop Forge Co., Rochester, N. Y.

STILLSON—See Walworth Mfg. Co.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., 55-71 Amory St., Roxbury, Mass. "Trimo."
(See page 573.)

VICTOR—See Bonner Mfg. Co.

WALWORTH Mfg. Co., Boston, Mass. "Stillson."
(See page 571.)

WELLS & Son Co., F. E., Greenfield, Mass.

WESCOTT—See Keystone Mfg. Co.

WRIGHT Wrench & Forging Co., 1424 Barth St., Canton, O.
(See page 573.)

TAP AND REAMER WRENCHES

AMERICAN Tap & Die Co., Greenfield, Mass.
(See page 561.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BASCOM—See Smart Mfg. Co.

BAY State Tap & Die Co., Mansfield, Mass.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BESLY Co., Chas. H., Chicago, Ill.
(See page 491.)

BILLINGS & Spencer Co., Hartford, Conn.
(See pages 191 and 192.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L. Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass. "Handy." "Horsfield."

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I. "Nichols."

CONANT & Donelson Co., Conway, Mass. "Reliable."

GOODELL-PRATT Co., Greenfield, Mass.
(See page 473.)

GREEN RIVER—See Wiley & Russell Mfg. Co.

HANDY—See Card Mfg. Co.

HART Mfg. Co., Cleveland, O.

HERCULES—See Reece Co.

HOLROYD & Co., Waterford, N. Y.

HORSFIELD—See Card Mfg. Co.

KEYSTONE Mfg. Co., Buffalo, N. Y.
(See page 571.)

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MARBACH Co., F. G., Medina, O.

MORSE Twist Drill & Machine Co., New Bedford, Mass.
(See page 497.)

NICHOLS—See Carpenter Tap & Die Co.

POORMAN Co., J. E., Philadelphia, Pa.

REECE Co., E. F., Greenfield, Mass. "Hercules."

RELIABLE—See Conant & Donelson.

SAWYER Tool Mfg. Co., Fitchburg, Mass.

SMART Mfg. Co., A. J., Greenfield, Mass "Bascom."

STANDARD Tool Co., Cleveland, O.

STARRETT Co., L. S., Athol, Mass.

VAN Buren Tool Co., Van Buren, Ind.

WELCH Co., Thomas F., Boston, Mass.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."
(See page 561.)

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River." "Lightning."

Complete Index to Classification appears on Pages 8 to 22.

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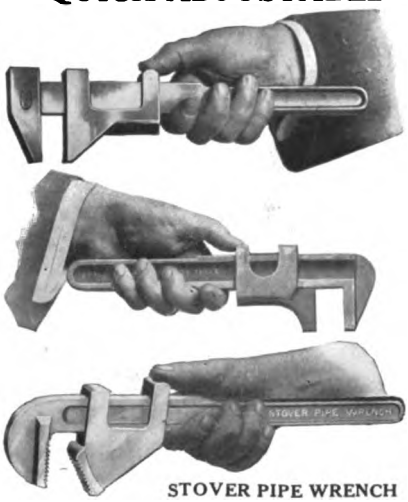
QUICK-ADJUSTABLE WRENCHES



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Adjusted and operated with one hand. A 14" Stover Wrench is ⅝ lb. lighter and 25% stronger than any other pipe wrench made. Takes a positive grip on any pipe from ¼" to 1½" without crushing, bruising or flattening. Moveable arc on jaw permits instant release of grip. Quickest, Strongest and Simplest pipe wrench on the market. Black—8" 65c—10" 75c—14" $1.00—18" $1.30—24" $2.00.

The Wright Monkey Wrench, Black or Gun Metal
" 60c.—8" 65c.—10" 75c. 12" 85c.—15" $1.50—18" $2.00 Net.

Oxidized
6" 75c. 8" 80c. Net.

Nickel Plated
6" 85c.—8" 90c. Net.

The Wright Automobile Wrench, Black or Gun Metal.
8" 75c.—10" $1.00 Net.

Oxidized
8" 90c.—10" $1.15 Net.

Nickel Plated
8" $1.00—10" $1.25 Net.

FORGINGS

We make all kinds of forgings—make them just the way you want them—rough, rough-turned or machined to blue prints—make and deliver them quickly. Heat treating furnaces under the direction of skilled and competent men. Send us your blue prints for quotation.

The WRIGHT WRENCH is made from open hearth drop-forged steel, carbonized, mottled and hardened. By government tests it has proved stronger than other widely advertised makes. It requires but one hand to adjust and operate it. One man with a Wright Wrench can do many jobs that require two men with any other wrench. Saves workmen's time. Pays for itself in a short time. Invaluable for jobs where it is necessary to hold a light or grasp some object for support. The principle of construction and material of The WRIGHT AUTOMOBILE WRENCH is the same as in our other wrenches, the chief difference being in the head which is made long and thin to adapt itself to the narrow and confined spaces of automobile machinery.

Write for Book and Trade Discounts.

THE WRIGHT WRENCH & FORGING CO., 1424 Barth St., Canton, Ohio

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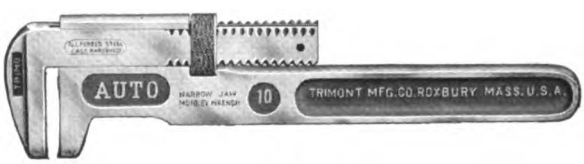
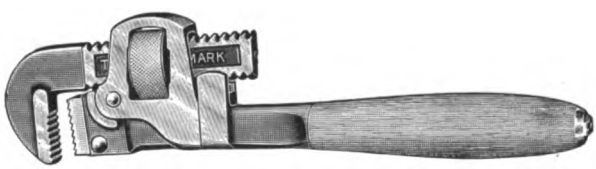


OUR NEW NARROW AUTO MONKEY WRENCH

Made in 10-Inch Polished Only



AUTO NARROW-JAW PIPE WRENCH

Made in 6-Inch, 8-Inch and 10-Inch Sizes

Manufactured by

Trimont Manufacturing Co.

ROXBURY (BOSTON), MASS.

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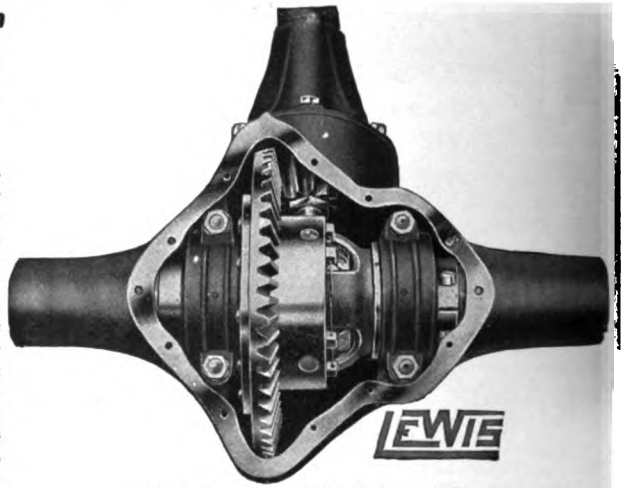
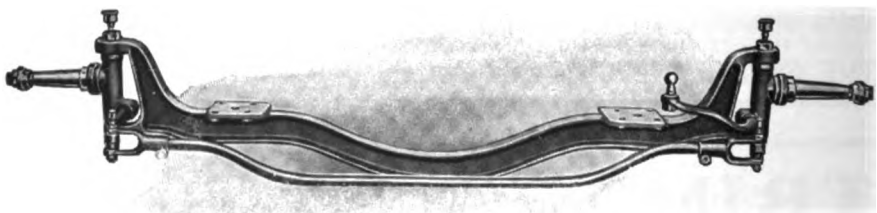
American Distributing Company, JACKSON, MICHIGAN

LEWIS QUALITY

The type of rear axle shown is a distinct advance in rear axle construction. It removes the vehicle load from the driving-shafts, eliminating the possibility of shaft breaking. High duty Hyatt Roller Bearings used in the wheels. The brakes are equally efficient in both directions of wheel rotation. The bands release instantly, and in released position stand entirely free from the drums. Lewis springs, axles, forgings, controls and transmissions are unexcelled for quality.



Gear Assembly of No. 8 Rear Axle



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Sales Representatives

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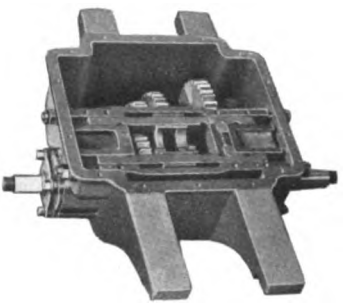
Hayes Wheels

The illustration shows one of the several types of truck wheels produced at the Hayes plant, in addition to the types of pleasure car wheels. The reputation of Hayes Wheels has been built, and the high opinion of automobile builders won and held, by a quality recognized as the best and highest.



Frost Gears

The Frost new plain bearing Sliding Gear Selective Type Transmission, three speeds ahead and reverse, is illustrated. The square shifter bars, running in accurately milled slots in a carrier case, are worthy of particular attention. This construction has distinct advantages in that it prevents the shifter forks from rubbing and rattling on the hubs of revolving gears, and also gives a larger and better bearing for the finder and locking pins, insuring better wearing qualities.

There are only two openings through the case (for main shaft), where there is any chance for leakage of oil. If necessary to get at the gears, shifter case, cover, rods and shifter forks can be taken out as a unit.

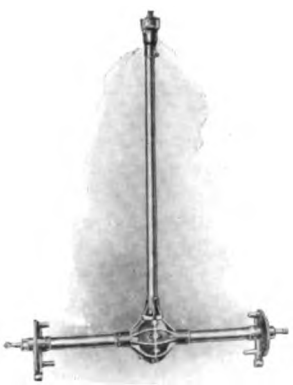
The shifter slide cover (not shown) contains the quadrant, so that a quadrant on the side of the car is unnecessary.

All gears are carbonized, heat treated and ground true with the pitch line.

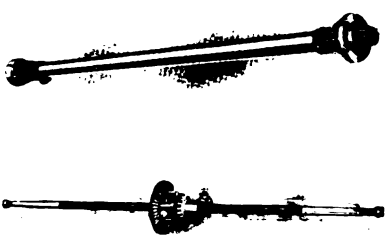
Prompt deliveries. A limited quantity of planetary transmissions in stock ready for immediate delivery.

American Gear & Manufacturing Co. Rear Axles for Light Cars

Durability is one of the strongest features of American rear axles for light cars. The better known and more popular cars of this type are fitted with our axles. Gears are properly hardened and accurately ground. Bearing equipment according to purchasers' specifications.



Rear Axle Assembled



Propeller Shaft in Housing and Rea Axle Driving Shaft

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TABLES AND DATA FOR ENGINEERS

REFERENCE TABLES FOR INDICATED HORSEPOWER

It is often convenient to have a ready reference table, by the aid of which an immediate approximation to the horsepower of a motor can be made when the bore and stroke are known. Such a table has been prepared by Worby Beaumont, the well-known English engineer, who gave permission to the editor of *The Automobile Club Journal* in London to publish it. One table gives the ratings of engines with the cylinder dimensions in inches and fractions, and the other table gives the results with cylinders built to metric measurements. Of course, in a table of this sort, an arbitrary set of conditions as to revolutions, mean effective pressure and mechanical efficiency have to be assumed; those employed represent average practice and the table is not offered as a substitute for experimentation when the most accurate results are desired.

It will be noted from Table I that in a very small space the estimated indicated power of engines with bore and stroke dimensions varying from 2-in. bore and 2-in. stroke to 6-in. bore and 6 1-2-in. stroke is given. Similarly, in Table II, a similar series is given in metric measurement, covering sizes from 70 mm. bore and 70 mm. stroke to 150 mm. bore and 165 mm. stroke. In Table I there is a quarter of an inch difference of size of bore and stroke measurements between any two powers given, and in Table II a difference of 5 mm. In explanation of the tables, it will be seen that in column 1 the bore or cylinder diameter of the engine may be found, and in the columns to the right of this, commencing with the column headed 0, the power of the engine having that cylinder diameter and a stroke of the same dimension. Columns 3 to 10 in each table give the powers of engines of, for instance, the same bore, but having a stroke greater than the bore by the amount stated at the top of the column. For example, referring to Table I, an engine having a cylinder 4 inches in diameter and a stroke of 4 inches would develop, under conditions to be stated, 4.27 i.h.p., as shown in the column headed 0; that is, column 2. If, however, the engine has a cylinder bore of 4 inches and a stroke of 5 1-2 inches, then the power developed is as shown in column 8, 5.89 i.h.p.

Similarly, for example, referring to Table II, an engine having a bore and stroke of 100 mm. would give 4.09 i.h.p., and an engine with a cylinder 100 mm. diameter and 140 mm. stroke would give 5.72 i.h.p.

It will be observed that to each bore dimension in column 1, two horizontal lines are given. The first of these gives the calculated power at a speed of 750 revolutions per minute, and the second the power at 1,000 revolutions per minute. The figures for the higher speed are printed in italic type.

The powers given in the tables represent the calculated indicated power given by one cylinder, and when multi-cylinder engines are being considered, the power shown by the table must be multiplied by the number of cylinders to give the total power.

To determine the useful power or brake horsepower, the mechanical efficiency of the engine has to be considered. No general rule can be given for this, and it may vary from a little less than 80 per cent. of the indicated power to as much as 88 per cent. For the majority of four-cylinder engines of good design and in good condition, run at speeds not unsuited to their design, and for powers of not less than 20 b.h.p., the efficiency may be considered to be 85 per cent. within reasonably close limits of accuracy. This figure is, however, merely suggestive, and it is necessary to be familiar with engine design and performances to correctly estimate the brake horsepower from the estimated indicated power of these small high-speed engines.

Very frequently an approximation to the calculated indicated power, or power developed in the cylinders, is all that is required to be known, and this may be taken direct from the tables, for the two named speeds; *i.e.*, 750 or 1,000 revolutions per minute. For other speeds the difference may be taken as arithmetically proportionate through a limited range according to the type and design of the engine.

(Tables on page 578)]

Index to Tables and Data appears on Pages 23 to 25.

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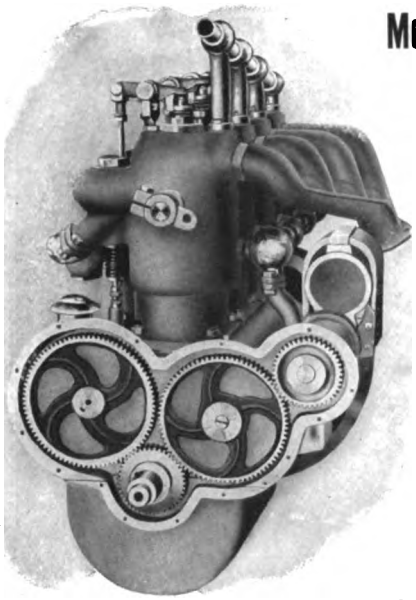


Motors, Transmissions and Clutches

We build 68 different sizes, from 3½ x 4½ to 20 x 30. Our Wells Clutch is the only clutch ever produced which gives better results than the multiple disc clutch when the latter is working at its best. It is a dry clutch and works the same every day in the year without attention. If interested send for bulletin No. 19.

For several years we have been paying particular attention to building motors and clutches best suited for hard commercial work; this sturdy construction rendering them the more desirable for the pleasure car as well.

The accessibility of our unit power plants will appeal to you. Governors can be furnished on any size when desired.

Sizes of Separate Units

4 Cyl. 3½x4½	4 Cyl., 4½ x 5½	4 Cyl., 5 x 6
4 " 4 x5	4 " 4½ x 6	4 " 6 x 6
4 " 4½ x 5	4 " 5 x 5½	4 " 6½ x 8
4 " 4½ x 5½		

Sizes of Unit Power Plants; 3-Point Suspension With Parts Readily Accessible

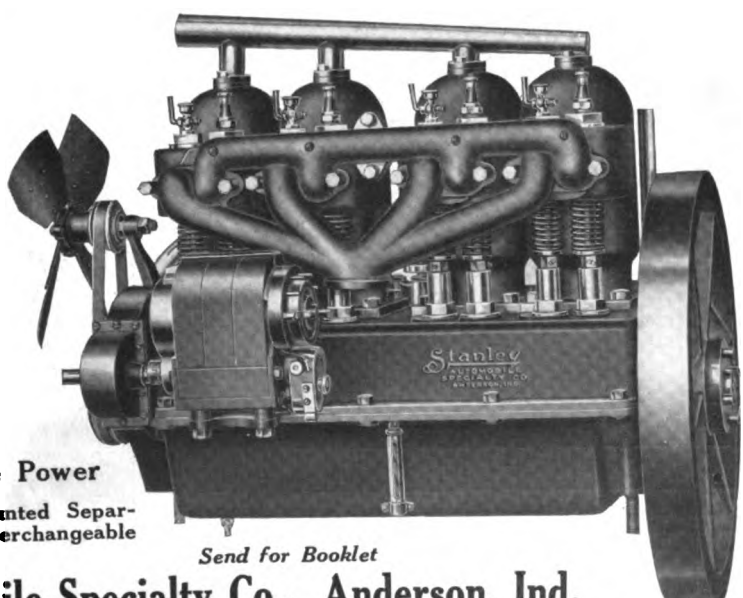
22 H.P. with three forward speed and reverse transmission. 30, 35 and 40 H.P. with four forward speed and reverse transmission. All unit power plants are equipped with Wells Clutches.

MODEL GAS ENGINE WORKS, PERU, INDIANA

L. B. 2000

STANLEY MOTORS

Easy, quiet-running, self-oiling, three point suspension



30 Horse Power

Cylinders Mounted Separately and Interchangeable

Send for Booklet

Automobile Specialty Co., Anderson, Ind.

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HORSEPOWER TABLE I.—Cylinder Dimensions in Inches and Fractions.

Bore	0	¼	½	¾	1	¼	½	¾	2
2	0.54	0.60	0.67	0.74	0.81	0.88	0.94	1.01	1.08
	0.72	*0.80*	*0.89*	*0.98*	*1.08*	*1.17*	*1.25*	*1.35*	*1.44*
2¼	0.76	0.84	0.92	1.01	1.09	1.18	1.26	1.35	1.43
	1.01	*1.12*	*1.22*	*1.34*	*1.45*	*1.57*	*1.68*	*1.81*	*1.90*
2½	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88
	1.30	*1.53*	*1.67*	*1.81*	*1.95*	*2.09*	*2.23*	*2.37*	*2.51*
2¾	1.39	1.51	1.64	1.77	1.89	2.02	2.14	2.27	2.40
	1.85	*2.02*	*2.19*	*2.36*	*2.53*	*2.70*	*2.87*	*3.04*	*3.20*
3	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00
	2.40	*2.60*	*2.80*	*3.00*	*3.21*	*3.40*	*3.61*	*3.81*	*4.00*
3¼	2.30	2.47	2.65	2.82	3.00	3.18	3.36	3.53	3.70
	3.06	*3.28*	*3.52*	*3.76*	*3.99*	*4.22*	*4.45*	*4.70*	*4.93*
3½	2.86	3.06	3.27	3.48	3.68	3.88	4.09	4.30	4.50
	3.81	*4.08*	*4.36*	*4.63*	*4.90*	*5.18*	*5.45*	*5.72*	*6.00*
3¾	3.53	3.76	4.00	4.35	4.47	4.71	4.95	5.18	5.41
	4.71	*5.02*	*5.34*	*5.65*	*5.97*	*6.28*	*6.60*	*6.91*	*7.23*
4	*4.27*	*4.65*	*4.81*	*5.08*	*5.35*	*5.61*	*5.89*	*6.15*	*6.41*
	5.71	*6.06*	*6.42*	*6.78*	*7.13*	*7.50*	*7.85*	*8.20*	*8.55*
4¼	5.13	5.44	5.74	6.04	6.34	6.64	6.95	7.25	7.55
	6.84	*7.24*	*7.64*	*8.05*	*8.45*	*8.85*	*9.25*	*9.66*	*10.07*
4½	6.19	6.53	6.87	7.22	7.56	7.90	8.25	8.59	8.93
	8.25	*8.68*	*9.16*	*9.62*	*10.08*	*10.54*	*10.96*	*11.41*	*11.87*
4¾	7.18	7.55	7.94	8.31	8.70	9.07	9.45	9.82	.....
	9.57	*10.07*	*10.57*	*11.09*	*11.58*	*12.08*	*12.59*	*13.09*	.....
5	8.38	8.80	9.22	9.65	10.05	10.46	10.90	.....	.....
	11.16	*11.72*	*12.28*	*12.84*	*13.40*	*13.95*	*14.50*	.....	.....
5¼	9.70	10.16	10.62	11.09	11.54	12.00	.....	.....	.....
	12.92	*13.54*	*14.15*	*14.76*	*15.40*	*16.00*	.....	.....	.....
5½	11.12	11.65	12.15	12.66	13.15	.....	.....	.....	.....
	14.84	*15.51*	*16.20*	*16.86*	*17.54*	.....	.....	.....	.....
5¾	12.71	13.27	13.82	14.38	.....	.....	.....	.....	.....
	16.96	*17.70*	*18.42*	*19.10*	.....	.....	.....	.....	.....
6	14.45	15.05	15.65	.....	.....	.....	.....	.....	.....
	19.25	*20.05*	*20.85*	.....	.....	.....	.....	.....	.....

HORSEPOWER TABLE II.—Cylinder Dimensions in Millimeters (Metric System).

Bore	0	5	10	15	20	25	30	35	40
70	1.40	1.50	1.59	1.69	1.80	1.89	1.99	2.10	2.20
	1.87	*2.00*	*2.13*	*2.26*	*2.40*	*2.53*	*2.66*	*2.80*	*2.94*
75	1.72	1.84	1.95	2.07	2.18	2.29	2.41	2.53	2.64
	2.30	*2.45*	*2.60*	*2.76*	*2.91*	*3.06*	*3.22*	*3.37*	*3.52*
80	2.09	2.23	2.35	2.49	2.62	2.76	2.88	3.02	3.14
	2.79	*2.97*	*3.14*	*3.32*	*3.49*	*3.67*	*3.84*	*4.02*	*4.19*
85	2.43	2.65	2.80	2.95	3.09	3.24	3.39	3.54	3.69
	3.34	*3.54*	*3.73*	*3.93*	*4.12*	*4.32*	*4.52*	*4.72*	*4.91*
90	2.97	3.14	3.30	3.46	3.64	3.80	3.96	4.13	4.30
	3.96	*4.18*	*4.40*	*4.62*	*4.85*	*5.06*	*5.28*	*5.50*	*5.72*
95	3.50	3.68	3.87	4.05	4.24	4.42	4.61	4.80	4.98
	4.67	*4.91*	*5.16*	*5.40*	*5.65*	*5.90*	*6.15*	*6.40*	*6.64*
100	4.09	4.29	4.49	4.70	4.90	5.11	5.30	5.51	5.72
	5.45	*5.71*	*5.99*	*6.26*	*6.53*	*6.81*	*7.07*	*7.35*	*7.62*
105	4.73	4.95	5.17	5.40	5.63	5.85	6.08	6.30	6.53
	6.30	*6.60*	*6.90*	*7.20*	*7.50*	*7.80*	*8.10*	*8.40*	*8.70*
110	5.43	5.69	5.93	6.19	6.44	6.68	6.96	7.16	7.42
	7.23	*7.58*	*7.90*	*8.25*	*8.57*	*8.90*	*9.23*	*9.55*	*9.90*
115	6.22	6.48	6.77	7.03	7.30	7.56	7.85	8.11	8.37
	8.30	*8.65*	*9.02*	*9.38*	*9.74*	*10.01*	*10.46*	*10.81*	*11.18*
120	7.07	7.37	7.66	7.96	8.25	8.53	8.84	9.13	9.41
	9.42	*9.82*	*10.21*	*10.61*	*11.00*	*11.39*	*11.79*	*12.18*	*12.57*
125	7.97	8.30	8.63	8.94	9.25	9.57	9.89	10.21	10.54
	10.64	*11.06*	*11.50*	*11.91*	*12.34*	*12.76*	*13.20*	*13.61*	*14.04*
130	8.95	9.30	9.65	9.99	10.34	10.70	11.01	11.38	.....
	11.94	*12.40*	*12.86*	*13.31*	*13.79*	*14.25*	*14.70*	*15.16*	.....
135	10.08	10.44	10.80	11.18	11.56	11.92	12.30	.....	.....
	13.41	*13.91*	*14.40*	*14.90*	*15.41*	*15.90*	*16.40*	.....	.....
140	11.22	11.65	12.04	12.44	12.84	13.25	.....	.....	.....
	14.99	*15.51*	*16.05*	*16.60*	*17.12*	*17.68*	.....	.....	.....
145	12.52	12.98	13.41	13.82	14.25	.....	.....	.....	.....
	16.70	*17.30*	*17.88*	*18.42*	*19.00*	.....	.....	.....	.....
150	13.81	14.26	14.72	15.40	.....	.....	.....	.....	.....
	18.41	*19.01*	*19.64*	*20.23*	.....	.....	.....	.....	.....

Index to Tables and Data appears on Pages 23 to 25.

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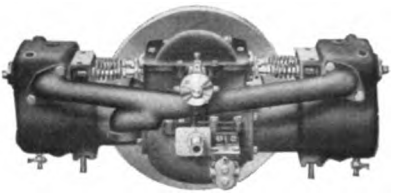
BEILFUSS AUTO MOTORS

SIZES:
18-20 H.P. 10-12 H.P.
Water Cooled.
Two-Cylinder Opposed.



10-12 H.P.
Air Cooled.
Two-Cylinder Opposed.
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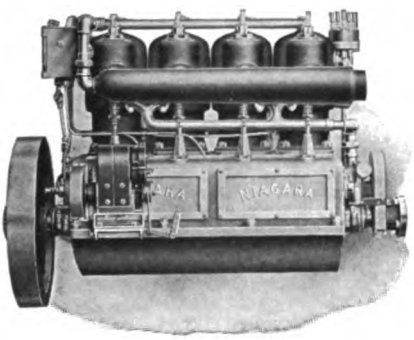

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4 Cycle type. Made in 2, 4 and 6 cylinders, 5 to 100 h.p.

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Hazard Motor Power Plants

Auto-Marine

Hazard Motor Mfg. Co.
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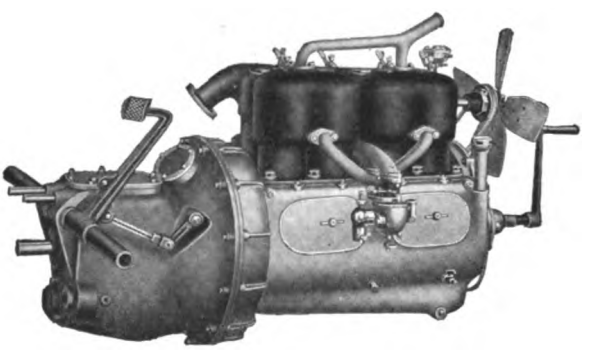

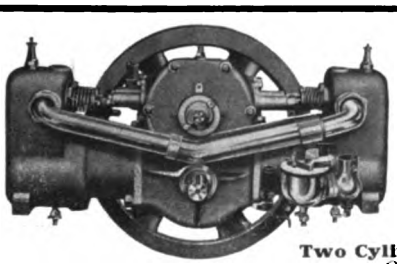

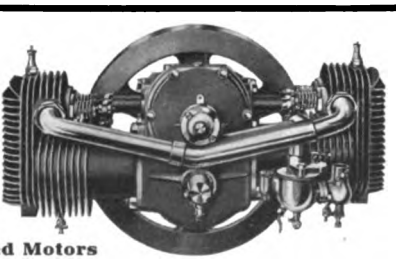

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Water Cooled.
5" Bore x 4" Stroke

Air Cooled.
4¼" Bore x 4" Stroke
4⅝" Bore x 4" Stroke
5" Bore x 4" Stroke

THE TIPPETT MFG. CO., 172-182 WEST LOCUST STREET, COLUMBUS, OHIO.

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HORSEPOWER OF INTERNAL COMBUSTION MOTORS (H. H. BROW

Owing to the great number of factors which influence the power delivered by high speed internal combustion engines the only sure way of determining this is by a brake test. Nevertheless, for purposes of easy comparison or for a basis for handicapping various authorities and associations have compiled various formulas from which the approximate D. H. P. can be calculated when certain data are known. In some cases a certain piston speed is assumed, while in others a certain r. p. m. is assumed. In these cases only the diameter and the stroke of the piston need be known.

In some of these formulas as originally compiled the area of the bore was taken as one of the factors, in others the stroke was expressed in feet or decimal fractions thereof. For the sake of uniformity and to save work the formulas are altered so that the square of the bore is used and the stroke is expressed in inches.

In one formula as originally compiled (that of the Royal Automobile Club), the dimensions were to be expressed in millimeters. The formulas have been altered so that it can be worked in inches.

The formula then becomes:

$$\frac{D^2 \times L \times n \times R}{C} = \text{Rated or delivered H. P.}$$

TABLES OF HORSEPOWER FORMULAS

Four-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. For gas.	$D^2 \times L \times R \times n$	19000
Roberts. For gasoline.	$D^2 \times L \times n \times R$	18000
Royal Automobile Club.	$(D + L)^2 \times n$	$\frac{6500}{25.6^2} = 9.92$
A. L. A. M.	$D^2 \times n$	2.5

This formula is on a basis of 1000-ft. piston speed.

American Power Boat Association.*	$D^2 \times n$	$\frac{2.000}{0.7854} = 2.5338$
A. P. B. A.* for motors of less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{1.000 \times 12}{.7854} = 15.20$

*The two formulas given above are for motors of boats rated as automobile boats. For others the rating should be taken as two-thirds of that given by these formulas. In case some device is used to force the charge into the cylinder 10 per cent. should be added to the ratings.

If an expansion or lower pressure cylinder is used 20 per cent. of the square of the diameter of this cylinder or cylinders shall be added to the $D^2 \times n$ and divided by the regular constant.

(Continued on page 586)

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If you are interested in the manufacture of any metal specialty such as

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Marine Engines
Motor Cycle Engines
Stationary Engines
Air Compressors
Transmission
Light Machinery of all Kinds

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THE FERRO MACHINE & FOUNDRY CO.

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(See page 584)

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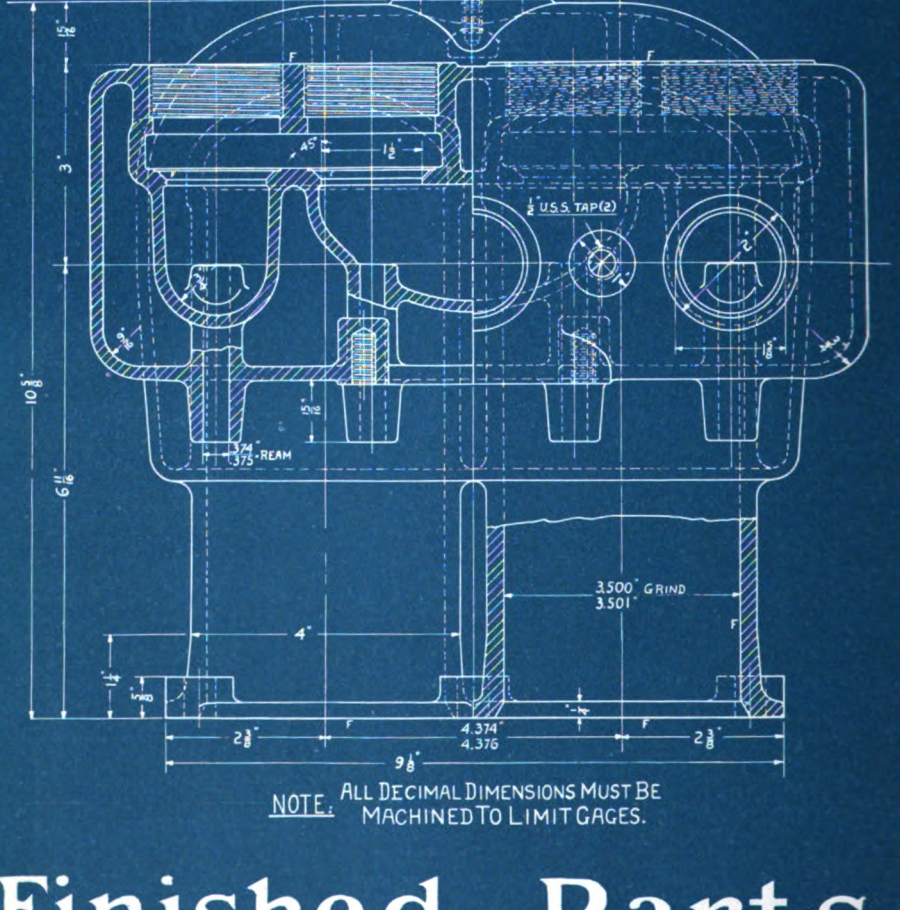
FERRO



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Our experts can furnish machined parts, absolutely accurate, at less cost than the majority of factories can produce them.

Quotations given from your blue prints.

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(See page 581)

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High Grade

Automobile **MOTORS** Marine

Ruggles Motor Company

Chicopee, :-: :-: Mass.

MOTORS Automobile and Marine

We are prepared to negotiate for business on $4\frac{1}{4} \times 4\frac{3}{4}$ and $4\frac{1}{2} \times 5$.

Wambold Manufacturing Co.

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WATER COOLED MOTORS

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MOTORS for Commercial or Pleasure Cars

Our own design—or to your blue print and specifications. Factory complete—Foundry for gray iron castings—Aluminum plant and machine shop equipped with newest and most up-to-date machinery. Prompt deliveries guaranteed—Send us blue print for estimate.

HOLBROOK ARMSTRONG IRON CO.

16th Street and Junction Ave., Racine, Wis.

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Two-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. Gas.	$D^2 \times L \times R \times n$	14000
Roberts. Gasoline.	$D^2 \times L \times R \times n$	13500
American Power Boat Association.*	$D^2 \times n$	$\frac{1.65}{.7854} = 2.1008$
Same for less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{12 \times .85}{\times .7854} = 12.987$

*The above are for automobile racing boat engines; for others the rating is taken as two-thirds of the above formulas. For engines having a displacer cylinder or cylinders the above rating is increased in the ratio that the displacer piston's displacement bears to that of the working cylinders.

INDICATED HORSEPOWER

On account of the great difficulty of securing good indicator cards at the high-piston and rotative speeds of automobile motors this is very little employed. The manograph which is employed for obtaining cards or diagrams from high-speed motors, as a general thing does not have an equal pressure scale and therefore does not readily lend itself to the accurate determination of I. H. P.

The indicated H. P. may of course be determined approximately by assuming a certain mechanical efficiency for the motor under consideration. This varies from as high as 90 per cent. in some cases to lower than 70 per cent. in others; the average would probably be not far from 80 per cent.

The formula for I. H. P., the bore and stroke being known as well as the R. P. M. and the mean effective pressure, is,

$$\frac{D^2 \times L \times R.P.M. \times n \times M.E.P.}{\frac{33{,}000. \times 12 \times 2}{.7854}} = I.H.P. \text{ (for 4-cycle).}$$

This constant equals 550,000 and the formula becomes $\frac{D^2 \times L \times n \times M.E.P. \times R.}{550{,}000.}$

The constant for 2-cycle is 275,000.

A formula which is given by Grover for the mean effective pressure, the compression being known, is as follows:

$$M.E.P. = 2C - 0.01\,C^2$$

C = Compression pressure above atmosphere in pounds per square inch.

This formula does not hold good for compression pressures over 100 pounds per square inch above atmosphere. Comparatively recent data seems to prove the reliability of this formula, also the fact, which Grover points out, that under favorable conditions, the values given by this formula may be slightly exceeded. Tests with higher pressures than 100 pounds show that the M. E. P. tends to remain at 100 pounds per square inch.

The compression pressure may be obtained by some form of gauge, the ignition for that cylinder being cut off, or in case the volume of the explosion chamber is known it may be obtained from the formula.

$PV^{1.3}$ = Constant. P being the absolute pressure.

V being taken in the one case as the volume of the combustion chamber and in the other as the above plus the piston displacement. P being in one case atmospheric pressure and in the other the absolute compression pressure. Of course for C in Grover's formula the assumed atmospheric pressure should be subtracted from the result obtained by this formula.

Index to Tables and Data appears on Pages 23 to 25.

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Diehl
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Automobile Motors

ANY SIZE

ANY SPEED

ANY VOLTAGE

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Diehl Manufacturing Company

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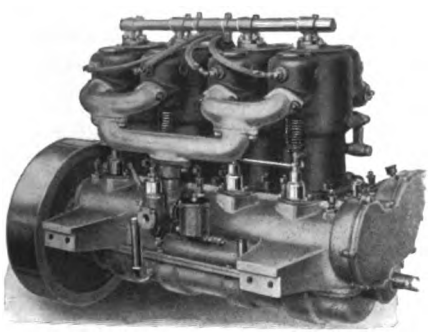
SCHLOSSER MFG. CO.'
MOTORS



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Unusually big bearings, individual cylinders. H. T. Magneto ignition. Perfect workmanship and finish throughout. : : : : : : :

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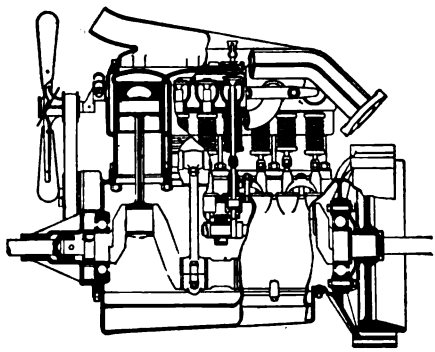

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Self Contained Oiler — Gear Driven.

Unit or Separate Power Plant.

Thermo Syphon or Pump Circulation.

Highest Grade Materials Throughout.

Right in Operation.

Right in price.

also

4 Cylinder Vertical 4 5/16 x 5
4⅛ x 4¾.

2 Cylinder Opposed 4½ x 4,
5¼ x 4½.

Capacity 3,000 Motors

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1256 Michigan Ave.
Chicago, Ill.

Sales Agents for
SOMMER MOTOR CO., Bucyrus, Ohio

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APPROXIMATE HORSEPOWER OF FOUR-CYCLE AUTOMOBILE ENGINES*

TABLE OF CONSTANTS FOR VARIABLE SPEEDS AND STROKES

Stroke in Ins.	Revolutions per Minute of Motor														
	500	550	600	650	700	750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
2.00.....	0.89	.098	.107	.116	.124	.134	.142	.153	.161	.169	.178	.187	.196	.205	214
2.25.....	.100	.110	.120	.130	.140	.151	.160	.171	.181	.190	.200	.210	.220	.231	.241
2.50.....	.112	.125	.133	.145	.156	.167	.176	.189	.201	.212	.223	.233	.245	.257	.268
2.75.....	.123	.135	.146	.159	.172	.184	.196	.208	.221	.233	.245	.256	.270	.282	.295
3.00.....	.134	.147	.160	.174	.187	.201	.214	.227	.241	.254	.267	.279	.294	.308	.322
3.25.....	.145	.158	.173	.188	.203	.219	.232	.246	.261	.275	.289	.303	.319	.333	.349
3.50.....	.156	.173	.186	.203	.218	.234	.250	.265	.281	.296	.312	.326	.343	.359	.375
3.75.....	.167	.184	.200	.218	.234	.252	.266	.284	.301	.317	.334	.349	.368	.385	.401
4.00.....	.178	.196	.214	.232	.249	.268	.285	.303	.321	.339	.356	.373	.392	.411	.429
4.25.....	.189	.208	.227	.246	.264	.285	.303	.322	.341	.360	.378	.396	.416	.436	.456
4.50.....	.200	.220	.240	.261	.280	.305	.321	.341	.361	.381	.400	.419	.441	.461	.485
4.75.....	.212	.233	.253	.275	.295	.319	.339	.360	.381	.402	.423	.443	.466	.486	.509
5.00.....	.223	.245	.266	.290	.312	.335	.357	.379	.401	.423	.445	.466	.491	.512	.536
5.25.....	.234	.257	.279	.304	.327	.351	.375	.398	.421	.444	.467	.490	.515	.538	.563
5.50.....	.245	.270	.293	.318	.343	.368	.393	.417	.441	465	.489	.513	.540	.564	.590
5.75.....	.258	.282	.307	.332	.369	.385	.410	.436	461	.486	.512	.536	.564	.589	.616
6.00.....	.268	.294	.320	.348	.375	.402	.428	.455	.481	.508	535	.559	.589	.615	.643

Bore in Ins.	Square of Bore
2.00	4.00
2.25	5.06
2.50	6.25
2.75	7.55
3.00	9.00
3.25	10.56
3.50	12.25
3.75	14.05
4.00	16.00
4.25	18.05
4.50	20.20
4.75	22.55
5.00	25.00
5.25	27.50
5.50	30.20
5.75	33.05
6.00	36.00

Rule:—Multiply number to right of bore by number in upper table at intersection of proper R.P.M. and stroke columns.

Example:—Find approximate horsepower developed by motor having 4.25″ bore and 5″ stroke at 800 revolutions per minute.

Under 4.25 bore we find 18.05.

At intersection of 5″ stroke line and 800 R.P.M. column in upper table we find .357.

The product of these numbers gives the horsepower, thus:

Approximate horsepower = 18.05 × .357 = 6 45 H.P.

These figures have been computed for the average M.E.P. as found in the ordinary motor car engine, but of course will vary with increase or decrease in compression and with different mechanical efficiencies.

*For multi-cylinder engines, multiply by number of cylinders. Above formula gives H.P. for only one cylinder

Index to Tables and Data appears on Pages 23 to 25.

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Shain's BALLSPRAY CARBURETOR

AN INSTRUMENT OF PRECISION
SEND FOR BOOKLET
CHAS. D. SHAIN, 1926 Broadway, N. Y.

No Float or Needle Valve Required

AUTOMATICALLY SHUTS OFF WHEN THE ENGINE STOPS

PRICES

1 inch, ...	$ 6.00
1¼ inch, ...	8.00
1½ inch, ...	10.00

DISCOUNT TO THE TRADE

Also Manufacturer of
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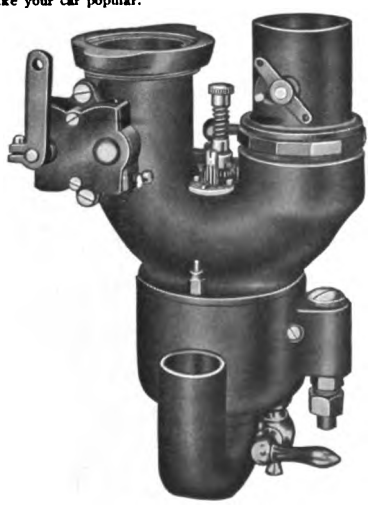
NOW IS THE TIME!

Do you want to reduce the running cost of your CAR? The

SIRO CARBURETOR

will do it. The lower the operating expense of your car the easier it is to make the sale to the man who has to pay that cost. Popularity is what sells the CAR. Siro Carburetor will make your car popular.

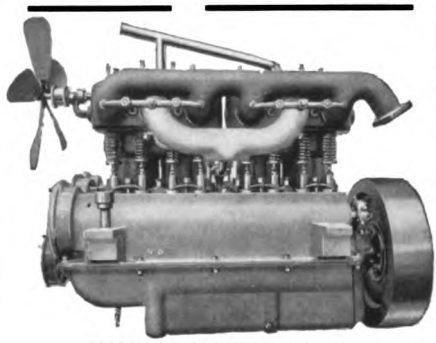


Manufactured by

Siro Carburotor Mfg. Co.

27-35 TAYLOR ST. SPRINGFIELD, MASS.

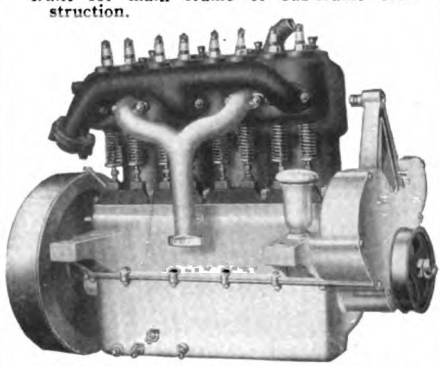
FALLS MOTORS



MODEL "B" 40 H. P.

SPECIFICATIONS (Cylinders in Pairs):

Bore, 4½". Stroke, 5".
Crank Shaft Diameter, 1⅞".
Drop to center of Crank Shaft, 3".
Fly Wheel, Diameter, 17".
Valve Head Diameter, 2⅜".
Distance, Center of Crank Shaft to top of Cylinder, 19 5-16".
Distance, center of Crank Shaft to bottom of Oil Pan, 7½".
Length, end of Fly to front of Crank Case, 38⅜".
Self Contained Oiling System (Gear Pump in Crank Case), positive lubrication.
Weight, 490 lbs.
Built for main frame or sub-frame construction.



MODEL "C" 30 H. P. EN BLOC.

SPECIFICATIONS:

Bore, 4". Stroke, 4½".
Crank Shaft Diameter, 1¾".
Drop to center of Crank Shaft, 2".
Fly Wheel, Diameter, 15¾".
Valve Head Diameter, 1 13-16".
Distance, center of Crank Shaft to top of Cylinder, 21½".
Distance, center of Crank Shaft to bottom of Oil Pan, 7".
Length, end of Fly to front of Crank Case, 31½".
Self Contained Oiling System (Gear Pump in Crank Case), positive lubrication.
Weight, 390 lbs. Sub Frame Construction.

FULTON-ZINKE CO.

1256 Michigan Ave., Chicago, Ill.

SALES AGENTS FOR

FALLS MACHINE COMPANY

SHEBOYGAN FALLS, WIS.

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BRAKE HORSEPOWER OF 2-CYCLE GASOLINE MOTORS

Determined by Tests of Marine Motors

HORSEPOWER OF 2 CYCLE ENGINES—ONE CYLINDER

	Bore and Stroke.	3 x 2½	3 x 3	3 x 3½	3 x 4	3½ x 3	3½ x 3½	3⅛ x 3¼
R.P.M...	300	.52	.62	.73	.83	.85	.99	.85
	400	.69	.83	.97	1.10	1.13	1.32	1.14
	500	.87	1.04	1.21	1.38	1.41	1.65	1.42
	600	1.04	1.25	1.45	1.66	1.70	1.97	1.71
	700	1.21	1.45	1.70	1.93	2.00	2.30	2.00
	800	1.38	1.65	1.94	2.20	2.26	2.62	2.28
	900	1.55	1.87	2.20	2.50	2.55	2.96	2.56
	1000	1.75	2.10	2.40	2.76	2.84	3.30	2.90
		4 x 3	3¾ x 3½	4 x 3½	3¾ x 4	3¾ x 3¾	4 x 4	4¼ x 4
R.P.M...	300	1.10	1.14	1.28	1.30	1.22	1.48	1.67
	400	1.47	1.50	1.72	1.73	1.62	1.97	2.22
	500	1.84	1.90	2.15	2.16	2.00	2.46	2.78
	600	2.20	2.30	2.58	2.60	2.44	2.94	3.34
	700	2.58	2.65	3.00	3.00	2.84	3.44	3.89
	800	2.94	3.00	3.42	3.45	3.24	3.92	4.45
	900	3.30	3.40	3.86	3.88	3.65	4.45	5.00
	1000	3.70	3.80	4.30	4.40	4.05	4.92	5.55
		4¼ x 4¼	4¾ x 4	4 x 5	4¼ x 4½	4½ x 4½	4½ x5	4½ x 5½
R.P.M...	300	1.77	2.08	1.85	1.87	2.10	2.34	2.58
	400	2.36	2.78	2.46	2.50	2.80	3.12	3.42
	500	2.95	3.46	3.07	3.12	3.50	3.90	4.30
	600	3.54	4.15	3.70	3.75	4.20	4.68	5.15
	700	4.13	4.85	4.30	4.37	4.90	5.45	6.00
	800	4.70	5.55	4.93	5.00	5.60	6.25	6.90
	900	5.30	6.20	5.50	5.60	6.30	7.00	7.70
	1000	5.90	6.90	6.15	6.25	7.00	7.80	8.60
		4¾ x 5	5 x 5	5 x 5¼	5 x 6	5¼ x 5½	5½ x 5	5¾ x 5
R.P.M...	300	2.60	2.88	3.00	3.46	3.44	3.50	3.80
	400	3.48	3.82	4.00	4.60	4.57	4.65	5.10
	500	4.35	4.80	5.05	5.75	5.70	5.80	6.35
	600	5.20	5.75	6.10	6.90	6.85	7.00	7.60
	700	6.10	6.70	7.05	8.05	8.15	8.15	8.90
	800	6.95	7.65	8.10	9.25	9.30	9.30	10.30
	900	7.80	8.65	9.20	....	10.50	10.50	11.40
	1000	8.70	9.60	10.00	....	....	11.60	12.70
		5½ x 5½	5½ x 6¼	5½ x 6½	6 x 6	6½ x 6½	6 x 7	
R.P.M...	300	3.84	4.35	4.50	4.95	6.30	5.80	....
	400	5.10	5.82	6.00	6.60	8.40	7.75	....
	500	6.40	7.25	7.60	8.30	10.50	9.70	....
	600	7.67	8.75	9.25	9.95	12.60	11.60	....
	700	9.00	10.20	10.60	11.60	14.70	13.50	....
	800	10.25	11.60	....	....	....	....	....
	900	11.50	....	....	....	....	....	....
	1000	....	....	....	....	....	....	....

Index to Tables and Data appears on Pages 23 to 25.

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THE ADVERTISING CARRIED IN THIS ISSUE OF

THE AUTOMOBILE TRADE DIRECTORY

is that of the majority of representative manufacturers of automobile parts and accessories.

It was not contracted for and printed in this volume because its projectors pinned faith in cursory and chance perusal by those who might be leafing over its pages.

To the contrary this advertising is presented here by manufacturers who know that it will be directly referred to hundreds of times by those who contemplate direct purchase—and that it will be directly profitable.

THE AUTOMOBILE TRADE DIRECTORY exercises its functions in exactly the manner implied by its name. It **directs** the buyer to those whose wisdom and foresight have led them to advertise in a medium of every-day value, and these buyers are men who control the expenditures involved in the construction and maintenance of every Automobile in America.

THE AUTOMOBILE TRADE DIRECTORY

INCORPORATED

231-241 West 39th Street, New York

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O'GORMAN'S HORSE-POWER REFERENCE TABLE

HORSE-POWER FROM BORE AND STROKE—FORMULA $KD^{1.6}S^{4}$.

To find the comparative horse-power number of a car, find the bore in mm. given in the extreme left-hand column and follow the horizontal line till you reach the column vertically below the stroke in mm. Thus, if the bore is 101.5 mm. and the stroke 114 mm. the horse-power number is 30.9. This is not the maximum power, but a representative figure for power.

Bore in MM.	Stroke in Millimetres															Bore in Inches
	55	57	60	63.5	65	70	75	76	80	82.5	85	89	90	95.2	100	
55	8.6	8.8	9	9.2	9.3	9.5	9.8	9.8	10	10.2	10.3	10.5	10.6	10.8	11	25/32
57	9.25	9.3	9.5	9.8	9.9	10.2	10.5	10.5	10.75	10.8	11	11.1	11.2	11.5	11.75	2¼
63.5	11	11.1	11.25	11.5	11.5	12	12.3	12.4	12.6	12.8	13	13.2	13.25	13.5	13.8	2½
65	11.2	11.3	11.6	11.8	12	12.3	12.7	12.8	13	13.2	13.4	13.6	13.7	14.0	14.3	29/16
70	12.75	12.9	13.2	13.4	13.5	14	14.5	14.5	14.75	14.9	15.2	15.4	15.5	15.8	16	2¾
75	14.2	14.3	14.6	15	15.1	15.5	16	16.1	16.5	16.7	16.9	17.2	17.3	17.7	18.1	2 15/16
76	14.5	14.8	15	15.4	15.5	16	16.5	16.6	17	17.1	17.4	17.7	17.75	18.2	18.5	3
80	15.7	16	16.2	16.6	16.8	17.3	17.8	17.9	18.3	18.5	18.8	19.1	19.2	19.6	20	39/64
82.5	16.4	16.6	17	17.3	17.5	18	18.6	18.7	19	19.3	19.5	19.9	20	20.5	20.8	3¼
89	18.7	18.9	19.3	19.7	20	20.5	21	21.2	21.6	21.9	22.2	22.6	22.7	23.2	23.7	3½
90	19.1	19.3	19.7	20.2	20.25	21	21.6	21.7	22.1	22.4	22.7	23.1	23.3	23.8	24.3	3 17/32
95.2	20.9	21.1	21.6	22	22.25	22.9	23.55	23.7	24.2	24.5	24.75	25.2	25.4	25.9	26.4	3¾
100	22.5	22.8	23.2	23.8	24	24.7	25.5	25.6	26.2	26.5	26.9	27.3	27.4	28	28.6	3 15/16
101.5	23	23.4	23.9	24.4	24.6	25.4	26	26.2	26.75	27.1	27.5	27.9	28	28.66	29.25	4
105	24.5	24.9	25.3	26	26.2	27	27.9	28	28.6	28.9	29.3	29.8	30	30.6	31.3	4⅛
108	25.25	25.6	26.2	26.8	27.2	28	28.8	29	29.6	29.9	30.3	30.8	31	31.66	32.3	4¼
114.5	.....	.....	.....	29.7	29.8	30.6	31.5	31.6	32.25	32.6	33	33.6	33.8	34.5	35.3	4½
115	28.3	28.8	29.3	30.3	30.3	31.2	32.1	32.3	32.9	33.3	33.7	34.3	34.5	35.2	36	4 17/32
120	30.4	30.7	31.3	32.3	32.8	33.2	34	34.3	35	35.4	35.9	36.5	36.7	37.5	38.3	4¾
125	31.8	32.2	32.8	34	34	35	36	36.2	36.9	37.4	37.8	38.5	38.7	39.6	40.4	4 15/16
127	33.2	33.5	34.3	35.2	35.3	36.3	37.3	37.6	38.3	38.8	39.25	40.0	40.2	41	41.8	5
130	34.1	34.6	35.2	36.4	36.4	37.5	38.6	38.8	39.5	40	40.5	41.1	41.3	42.3	43.2	5⅛
		2¼		2½		2¾		3		3¼		3½		3¾		
	Stroke in Inches															

Bore in MM.	Stroke in Millimetres															Bore in Inches
	101.5	105	108	110	114	115	120	125	127	130	133	135	139	140	145	
55	11.1	11.2	11.3	11.4	11.6	11.7	11.8	12	12.1	12.2	12.3	....	.....	.....	.....	25/32
57	11.7	12	12	12.2	12.3	12.4	12.5	12.75	12.8	13	13.1	....	.....	.....	.....	2¼
63.5	13.9	14.1	14.2	14.4	14.5	14.6	14.8	15	15.2	15.4	15.5	....	.....	.....	.....	2½
65	14.4	14.6	14.8	14.9	15.2	15.3	15.5	15.7	15.8	15.9	16.1	....	.....	.....	.....	29/16
70	16.2	16.5	16.6	16.75	17	17	17.4	17.6	17.7	18	18.1	....	.....	.....	.....	2¾
75	18.2	18.4	18.6	18.8	19	19.1	19.4	19.7	19.8	20	20.2	....	.....	.....	.....	2 15/16
76	18.6	18.9	19.1	19.2	19.4	19.5	19.85	20.2	20.3	20.5	20.7	....	.....	.....	.....	3
80	20.0	20.4	20.6	20.8	21	21.2	21.5	21.8	21.9	22.2	22.4	....	.....	.....	.....	39/64
82.5	20.9	21.2	21.4	21.6	21.9	22	22.35	22.7	22.8	23.0	23.3	....	.....	.....	.....	3¼
89	23.8	24.1	24.4	24.55	24.9	25	25.4	25.8	26	26.2	26.5	....	.....	.....	.....	3½
90	24.4	24.7	25	25.2	25.5	25.6	26.0	26.5	26.6	26.9	27.2	....	.....	.....	.....	3 17/32
95.2	26.6	26.9	27.2	27.45	27.9	28	28.4	28.9	29.0	29.4	29.7	....	.....	.....	.....	3¾
100	28.8	29.2	29.4	29.7	30	30.2	30.8	31.2	31.4	31.7	31.9	....	.....	.....	.....	3 15/16
101.5	29.4	29.85	30.2	30.4	30.9	31	31.5	32	32.2	32.6	32.9	33	33.5	33.5	34	4
105	31.4	31.4	32.2	32.5	33	33.1	33.7	34.2	34.4	34.8	35.1	35.2	35.8	35.9	36.3	4⅛
108	32.5	33	33.3	33.5	34	34.2	34.75	35.3	35.5	35.9	36.2	36.4	36.8	37	37.5	4¼
114.5	35.5	36	36.3	36.6	37.2	37.3	37.9	38.6	38.8	39.2	39.6	39.8	40.3	40.4	41	4½
115	36.1	36.1	37	37.4	37.9	38	38.7	39.3	39.5	39.9	40.3	40.5	41.1	41.2	41.8	4 17/32
120	38.5	39	39.5	39.8	40.4	40.6	41.3	42	42.2	42.7	43	43.3	44	44	44.6	4¾
125	40.6	41.2	41.6	42	42.5	42.7	43.5	44.2	44.4	44.8	45.3	45.4	46.1	46.3	46.9	4 15/16
127	42.0	42.7	43.1	43.5	44.0	44.25	45	45.75	46	46.5	46.9	47.2	47.8	48	48.6	5
130	43.4	44	44.5	45	45.5	45.7	46.5	47.3	47.5	48	48.5	48.7	49.4	49.6	50.2	5⅛
	4		4¼		4½		4¾		5		5¼		5½			
	Stroke in Inches															

(Table continued on page 594)

Index to Tables and Data appears on Pages 23 to 25.

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Stutz Auto Parts Co.

Indianapolis, Ind.

Mfrs. of the Stutz Rear System, a three-speed selective type transmission rear axle. Also Jack Shafts.

Two Models: 20 h. p. and 35 h. p.

BRANDENBURG & CO., 319 Michigan Ave., Chicago—Sales Representatives

We have a department with the most up-to-date equipment for making

AUTOMOBILE TRANSMISSIONS

Long Distance Telephone Manufacturing Co.

SOUTH BEND, INDIANA

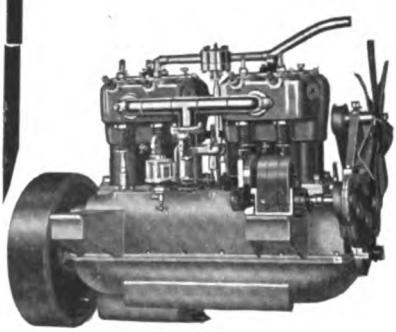
Here is a motor designed just the way you want it. It has distinctive features of construction that increase its efficiency and durability.

The crankshaft is of large diameter—a self-contained oiling system, supplied by a gear pump through the hollow crankshaft, provides perfect oiling. The extra large bearings reduce friction to a minimum and increase durability. Double ignition system—magneto or battery—or both.

5 TYPES—4 CYCLE.

3¾ inch bore—5 inch stroke, 4 cyl.—25 to 30 H.P.
4¼ inch bore—5 inch stroke, 4 cyl.—30 to 35 H.P.
4¼ inch bore—5 inch stroke, 6 cyl.—45 to 50 H.P.
4¾ inch bore—5½ inch stroke, 4 cyl.—40 to 45 H. P.
5¼ inch bore—7 inch stroke, 4 cyl.—50 to 55 H.P.

Wisconsin Motor Mfg. Co.,
DEPARTMENT 27,
MILWAUKEE, WIS.



Wisconsin

Motors

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O'GORMAN'S HORSE-POWER TABLE (Continued)

Bore in MM.	Stroke in Millimetres															Bore in Inches
	146	150	152	155	158	160	165	170	171	175	178	180	184	185	190	
55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25/32
57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 1/4
63.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 1/2
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29/16
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 3/4
75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 15/16
76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 9/64
82.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 1/4
89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 1/2
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 17/32
95.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 3/4
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 15/16
101.5	34.1	34.5	34.7	35	35.2	35.4	35.8	36.2	36.3	36.7	36.9	37	.....	37.4	.....	4
105	36.4	36.8	37	37.3	37.5	37.7	38	38.5	38.6	38.9	39.1	39.3	.....	39.6	.....	4 1/8
108	37.6	38	38.2	38.5	38.8	39	39.5	39.9	40	40.4	40.6	40.8	.....	41.2	.....	4 1/4
114.5	41.2	41.5	41.8	42	42.5	42.6	43.2	43.7	43.8	44	44.4	44.6	.....	45	.....	4 1/2
115	41.9	42.3	42.6	43	43.4	43.6	44	44.6	44.7	45.1	45.3	45.5	.....	45.9	.....	4 17/32
120	44.7	45.2	45.5	45.8	46.2	46.4	47	47.5	47.6	48	48.3	48.6	.....	49	.....	4 3/4
125	47	47.5	47.9	48.3	48.7	48.9	49.5	50.1	50.2	50.6	50.9	51.2	.....	51.6	.....	4 15/16
127	48.7	49.3	49.5	50	50.4	50.5	51.2	51.8	52	52.4	52.8	53	.....	53.5	.....	5
130	50.2	50.8	51.2	51.6	52	52.2	52.8	53.5	53.6	54.2	54.4	54.7	.....	55.2	.....	5 1/8
	5 3/4		6		6 1/4		6 1/2		6 3/4		7			7 1/4	7 1/2	
	Stroke in Inches															

A. L. A. M. STANDARD HORSE POWER FORMULA

(Bore of Cylinder Squared x No. of Cylinders, ÷ 2.5)

Bore		Horse Power			
Inches	Mill.	1 Cyl.	2 Cyl.	4 Cyl.	6 Cyl.
2 1/2	64	2 1/2	5	10	15
2 5/8	68	2 3/4	5 1/2	11	16 1/2
2 3/4	70	3	6	12 1/10	18 1/5
2 7/8	73	3 5/16	6 5/8	13 1/4	19 7/8
3	76	3 3/5	7 1/5	14 2/5	21 3/5
3 1/8	79	3 15/16	7 13/16	15 5/8	23 7/16
3 1/4	83	4 1/4	8 1/2	16 9/10	25 2/5
3 3/8	85	4 9/16	9 1/8	18 1/4	27 2/5
3 1/2	89	4 9/10	9 4/5	19 3/5	29 2/5
3 5/8	92	5 1/4	10 1/2	20 1/4	31 3/5
3 3/4	95	5 5/8	11 1/4	22 1/2	33 3/4
3 7/8	99	6	12	24	36 1/16
4	102	6 2/5	12 4/5	25 3/5	38 2/5
4 1/8	105	6 13/16	13 5/8	27 1/4	40 9/10
4 1/4	108	7 1/4	14 1/2	28 9/10	43 4/5
4 3/8	111	7 5/8	15 5/16	30 5/8	45 15/16
4 1/2	114	8 1/10	16 1/5	32 2/5	48 3/5
4 5/8	118	8 9/16	17 1/8	34 1/4	51 3/5
4 3/4	121	9	18	36 1/10	54 1/10
4 7/8	124	9 1/2	19	38	57
5	127	10	20	40	60
5 1/8	130	10 1/2	21	42	63
5 1/4	133	11	22	44 1/10	66 1/5
5 3/8	137	11 9/16	23	46	69 1/10
5 1/2	140	12 1/10	24 1/5	48 2/5	72 3/5
5 5/8	143	12 5/8	25 5/16	50 5/8	75 15/16
5 3/4	146	13 1/4	26 1/2	53	79 1/2
5 7/8	149	13 13/16	27 5/8	55 1/4	82 9/10
6	152	14 2/5	28 4/5	57 3/5	86 2/5

Computed at 1,000 feet per minute piston speed.

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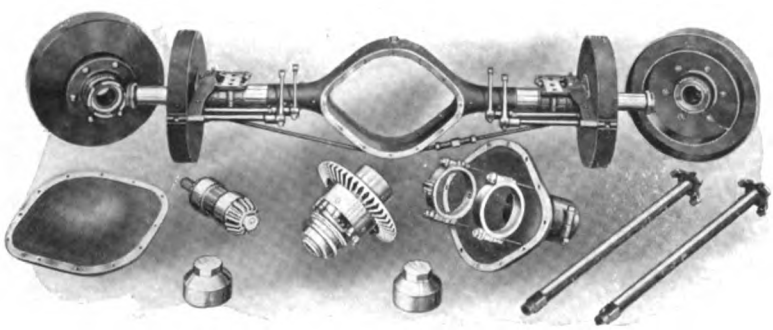
THE
DUNLAP
ENGINEERING COMPANY

High Grade Axles

for

High Grade Cars



COLUMBUS
OHIO

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CHARACTERISTICS OF GAS MOTORS FOR AERIAL NAVIGATION

Compiled by J. S. Critchley, Institution of Automobile Engineers

INCLINED TYPE.

Antoinette	8	80	80	1,400	92	1	32	2.9	Water.
	8	110	105	1,100	209	.95	67.2	3.1	Water.
	16	80	80	1,400	165	1	64	2.6	Water.
	16	110	105	1,100	264	.95	134	2	Water.
Anzani	4	100	120	1,600	187	1.2	30	6.2	Water.
	4	135	150	1,400	308	1.1	56.4	5.4	Water.
Aeroplane	8	101	120	1,500	452	1.19	59	7.6	Water.
Brouhot	8	105	110	1,400	308	1.04	61.4	5	Water
Easton Cord. Co.	8	95	101	.....	275	1.05	49.6	5.5	Water.
	8	114	114	.....	300	1	74.5	4	Water.
E. N. V.	8	85	90	.....	150	1.05	38.4	3.8	Water.
	8	105	110	.....	286	1.04	62	4.6	Water.
	8	100	130	.....	440	1.3	60.5	7.3	Water.
	8	100	130	.....	363	1.3	60.5	6.0	Water.
Gobron-Brille	8	90	160	1,400	330	1.8	53.8	6.1	Water.
	8	120	200	1,400	352	1.66	120	3.4	Water.
J. A. P.	8	85	95	1,500	220	1.1	38.4	5.7	Air.
	8	90	110	1,300	303	1.2	45.5	6.7	Water.
Mors	4	100	130	1,700	213	1.3	30	7.1	Water.
Pipe	8	100	100	1,950	289	1	55	5.3	Air.
Renault	8	90	120	1,800	374	1.3	46.2	8.1	Air.
	8	100	120	1,200	574	1.2	58.5	9.8	Water.
	8	90	140	1,500	550	1.5	50.5	10.9	Air. †
Simms	6	110	110	1,000	220	1	51.1	4.3	Water.
Wolseley	8	95	127	1,350	300	1.3	54	5.6	Water.

HORIZONTAL TYPE.

Darracq	2	130	120	.....	121	.92	24.2	5	Water.
	4	130	120	.....	242	.92	48.4	5	Water.
Dutheil-Chalmers	2	128	130	1,200	132	1.02	24.2	5.5	Water.
	4	128	130	1,200	164	1.02	48.4	3.4	Water.
	6	128	130	1,200	385	1.02	72.6	5.3	Water.
	4	160	140	1,200	550	.88	75.8	7.3	Water.
	2	110	300	1,000	220	2.73	37.6	5.9	Water.‡
	3	110	300	1,000	396	2.73	56.4	7.0	Water.‡
	4	110	300	1,000	528	2.73	75.2	7.0	Water.‡
	4	125	300	1,000	792	2.4	97	8.2	Water.‡

RADIAL TYPE.

Anzani	3	85	85	1,800	77	1	14	5.5	Air.
	3	85	100	1,800	94	1.17	15	6.2	Air.
	3	105	130	1,600	145	1.2	24.5	5.9	Air.
	3	120	130	1,500	176	1.08	31.6	5.5	Air.
	3	135	150	1,400	231	1.1	42.3	5.4	Air.
Buchet	6	80	80	1,800	110	1	24	4.6	Air.
Clement	7	100	115	1,100	154	1.15	50	3.1	Water.
Farcot	8	105	120	1,200	242	1.14	64	3.7	Air.
Miesse	8	130	130	1,200	245	1	100	2.45	Water.
R. E. P.	5	85	95	1,400	115	1.1	23.5	4.9	Air.
	7	85	95	1,400	150	1.1	33.5	4.5	Air.
	10	85	95	1,400	216	1.1	48	4.5	Air.

ROTARY TYPE.

Gnome	5	100	100	1,300	132	1	34	3.9	Air.
	7	110	120	1,200	165	1.1	61.5	2.7	Air.
	14	110	120	1,200	220	1.1	123	1.8	Air.
International	4	95	64	1,500	80	66	21.5	3.7	Air.
	6	127	101	1,500	130	.8	66	1.9	Air.

* Two stroke.
† Balloon type.
‡ Opposed pistons, similar to Gobron-Brillie pistons, coupled to cranks at each end.

Continued on Page 598.

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1911 Petrel

"The Aristocrat of Medium Priced Cars."

SEVEN - MODELS - SEVEN

$850 to $1,600

The Car of Perfect Control, Silence and Comfort

If the Petrel is not represented in your vicinity, write us to-day before the opportunity is gone.
Immediate Delivery.

PETREL MOTOR CAR CO., Milwaukee, U. S. A.

Rauch & Lang Electrics

are sufficiently well advertised nationally to make selling them an easy transaction.
The Rauch & Lang cars will meet every demand and fulfill every promise.
This means satisfied customers.
Some excellent territory remains open.
We know you can sell Rauch & Lang Electrics to the mutual advantage of yourself as well as this company.
A letter will bring our sales plan. It is worth considering.

RAUCH & LANG CARRIAGE CO.
2180 West 25th Street, Cleveland, Ohio

STAVER-CHICAGO

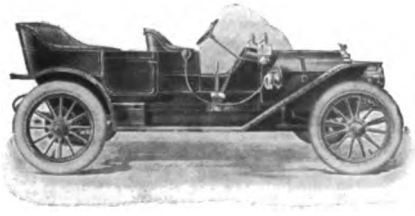
We have a dealer's proposition for 1911 decidedly different, because it was planned from the dealer's standpoint. It means a great car with a 100% perfect selling plan and a price proposition in a class by itself.

Full line of models—30, 35 and 40 h.p.—$1450 to $2000.

Dealers everywhere are investigating. HOW ABOUT YOU?

Staver Carriage Company, 76th and Wallace Sts. CHICAGO

THE 1911 SCHACHT



Seven - passenger touring car 35-40 4-cyl. motor cast en bloc. $1385

Equipment: 2 gas lamps, 3 oil lamps, magnetos with dual system, horn, pump, jack and tire repair outfit.

Selective Sliding Gear Transmission, 3 Speeds Forward, 1 Reverse, Shaft Drive, 120-inch Wheel-base, 34 x 3½ Q. D. Tires. 34 x 4 Tires $50.00 extra.

WRITE FOR DETAILED CATALOGUE

THE SCHACHT MOTOR CAR CO., 2780 Spring Grove Ave., **CINCINNATI, O.**

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CHARACTERISTICS OF GAS MOTORS, Etc.—(Continued)

VERTICAL TYPE

Name.	No. of Cylinders.	Bore in Mm.	Stroke in Mm.	Stated No. of Revolutions.	Stated Weight in Pounds	Stroke / Bore.	H.P. $\frac{.197d.(d-1)}{\times(R+2)N}$	Pounds per H.P.	Cooling System.
Aster	4	130	140	1,000	242	1.08	51	4.7	Water.
Bates	4	101	101	.....	116	1	28.8	4	Water.
Clement	6	155	185	.....	880	1.19	117.5	7.5	Water.
	4	190	230	.....	1,100	1.1	118.5	9.3	Water.
	4	100	120	.....	213	1.2	29	7.3	Water.
Darracq	4	120	140	1,500	374	1.1	43.1	8.7	Water.
	4	170	140	1,200	550	.8	84	6.5	Water.
Green	4	105	120	1,200	160	1.14	32	5	Water.
	4	140	146	1,100	236	1.05	60	3.9	Water.
	8	116	140	1,100	.....	1.2	82	...	Water.
Gregoire	4	92	140	1,500	174	1.5	26.1	6.6	Water.
	4	130	140	1,000	242	1.08	51	4.7	Water.
Metallurgique	4	100	150	1,850	300	1.5	32	9.4	Water.
	4	125	152	1,600	550	1.2	48.5	11.3	Water.
N. E. C.	4	114	101	1,500	290	.88	69.6	4.15	Air.*
Panhard	4	185	200	900	836	1.1	112	7.5	Water.
	4	170	170	900	523	1	90	5.8	Water.
	4	125	150	900	466	1.2	48.5	9.6	Water.
Renault	4	110	160	1,100	286	1.4	38.5	7.4	Water.
	4	116	150	1,300	880	1.3	42.5	20.7	Water.
Vivinus	4	106	120	1,600	.....	1.1	32.5	...	Water.
	4	112	130	1,600	336	1.16	37.5	9.0	Water.
	4	115	130	1,800	280	1.13	39.2	7.1	Water.
Wright	4	108	110	1,200	176	1	32.5	5.4	Water.

Complete Index to Classification appears on Pages 8 to 22.

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Ten thousand persons are daily employed in selling E-M-F "30" and Flanders "20" automobiles—and they all work for love. They are satisfied owners.

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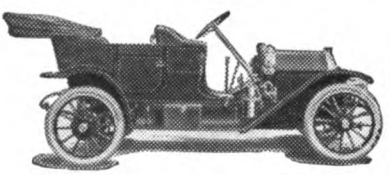
Great Western Automobile Co.
PERU, INDIANA



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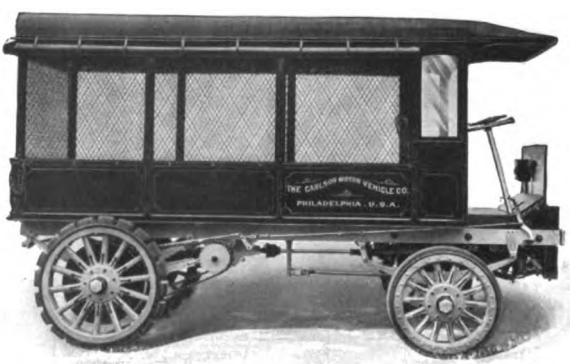
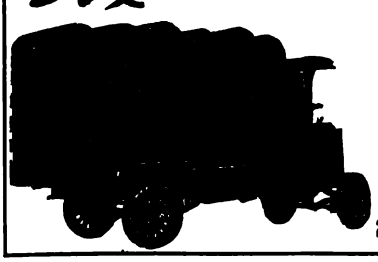
Summerdale, Philadelphia, Pa.



Rapid



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offer greater money-making possibilities to the live agent or business man, with financial backing, than any other line. Rapid Commercial Power Wagons are built in sizes from ½ to 6 tons capacity, for any line of business. Every user of one or more horses represents a prospective buyer. See the possibilities now? Write to-day for catalog and agent's prospectus.

RAPID MOTOR VEHICLE COMPANY
212 Rapid Street **Pontiac, Mich., U. S. A.**

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TABLE OF CRANK ANGLES AND CORRESPONDING PISTON POSITIONS

Out denotes the stroke towards the crankshaft.
In denotes the stroke away from the crankshaft.

Crank Angles in Degrees	Connecting Rod to Crank Ratio = 4		Connecting Rod to Crank Ratio = 4.5		Connecting Rod to Crank Ratio = 5	
	Out	In	Out	In	Out	In
2	.0004	.0002	.0004	.0003	.0004	.0003
4	.0015	.0010	.0015	.0010	.0015	.0010
6	.0034	.0021	.0033	.0021	.0033	.0022
8	.0061	.0036	.0060	.0038	.0058	.0039
10	.0095	.0057	.0092	.0059	.0091	.0061
12	.0136	.0082	.0133	.0087	.0131	.0088
14	.0185	.0112	.0181	.0116	.0178	.0119
16	.0241	.0146	.0236	.0152	.0232	.0156
18	.0304	.0185	.0298	.0192	.0293	0197
20	.0375	.0228	.0367	.0237	.0360	.0243
22	.0452	.0276	.0442	.0286	.0434	.0294
24	.0536	.0329	.0524	.0340	.0515	.0349
26	.0627	.0385	.0613	.0399	.0602	.0410
28	.0724	.0447	.0708	.0462	.0696	.0475
30	.0827	.0513	.0809	.0531	.0796	.0545
32	.0936	.0583	.0916	.0603	.0901	.0619
34	.1051	.0658	.1029	.0680	.1012	.0698
36	.1172	.0738	.1147	.0762	.1128	.0782
38	.1298	.0822	.1271	.0848	.1250	.0870
40	.1430	.6910	.1400	.0939	.1377	.0962
42	.1565	.1002	.1534	.1034	.1509	.1059
44	.1707	.1099	.1673	.1134	.1646	.1161
46	.1853	.1201	.1816	.1237	.1787	.1267
48	.2003	.1306	.1963	.1345	.1392	.1377
50	.2156	.1416	.2115	.1458	.2081	.1491
52	.2314	.1530	.2270	.1574	.2234	.1609
54	.2474	.1648	.2428	.1695	.2391	.1732
56	.2638	.1769	.2589	.1819	.2550	.1858
58	.2805	.1896	.2754	.1947	.2713	.1988
60	.2974	.2026	.2920	.2079	.2878	.2122
62	.3146	.2159	.3090	.2215	.3046	.2260
64	.3320	.2297	.3262	.2355	.3215	.2401
66	.3495	.2438	.3435	.2498	.3387	.2545
68	.3672	.2582	.3610	.2644	.3561	.2693
70	.3850	.2730	.3786	.2794	.3735	.2844
72	.4028	.2881	.3963	.2947	.3911	.2998
74	.4208	.3036	.4141	.3103	.4088	.3155
76	.4388	.3193	.4319	.3261	.4266	.3315
78	.4568	.3353	.4498	.3422	.4444	.3477
80	.4747	.3516	.4677	.3586	.4622	.3642
82	.4927	.3682	.4857	.3753	.4799	.3809
84	.5105	.3849	.5034	.3921	.4977	.3978
86	.5283	.4019	.5211	.4091	.5154	.4149
88	.5460	.4191	.5388	.4263	.5330	.4321
90	.5635	.4365	.5563	.4437	.5505	.4495
92	.5802	.4540	.5737	.4612	.5670	.4670
94	.5981	.4787	.5909	.4789	.5851	.4846
96	.6151	.4895	.6079	.4966	.6022	.5028
98	.6318	.5073	.6247	.5143	.6191	.5201
100	.6484	.5253	.6414	.5323	.6358	.5378
102	.6647	.5432	.6578	.5502	.6523	.5556
104	.6807	.5612	.6739	.5681	.6685	.5734
106	.6964	.5792	.6897	.5859	.6845	.5912
108	.7119	.5972	.7053	.6037	.7002	.6082
110	.7270	.6150	.7206	.6214	.7156	.6265
112	.7418	.6328	.7356	.6390	.7307	.6439
114	.7562	.6505	.7502	.6565	.7455	.6613

(Continued on page 602)

Index to Tables and Data appears on Pages 23 to 25.

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GILL FORGED CRANK-SHAFTS

The P. H. Gill & Sons Forgo and Machine Works, Lorraine and Otsego Streets, Brooklyn, N. Y. We wish to call the Trade's attention to our L. K. Nickel Steel Crank-shafts and Gear Blanks, etc., Domestic and Foreign. Chrome Nickel Steel and Vanadium Steel.

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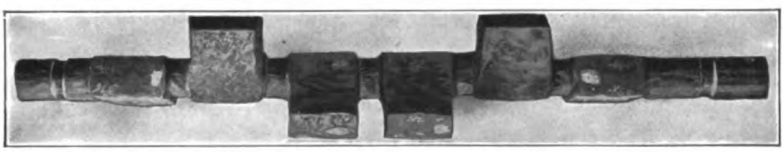

CRANK SHAFTS

COMPLETELY MACHINED, WITH GROUND BEARINGS FOR AUTOMOBILE AND MARINE MOTORS

ATLAS MANUFACTURING CO.

SEND BLUE PRINTS FOR ESTIMATES

FOSTORIA, OHIO

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Crank Angles in Degrees	Connecting Rod to Crank Ratio=4		Connecting Rod to Crank Ratio=4.5		Connecting Rod to Crank Ratio=5	
	Out	In	Out	In	Out	In
116	.7703	.6680	.7645	.6738	.7590	.6785
118	.7841	.6854	.7785	.6910	.7740	.6954
120	.7974	.7026	.7921	.7080	.7878	.7122
122	.8104	.7195	.8053	.7246	.8012	.7287
124	.8230	.7362	.8181	.7411	.8142	.7450
126	.8352	.7526	.8305	.7572	.8268	.7609
128	.8470	.7686	.8426	.7730	.8391	.7766
130	.8584	.7844	.8542	.7885	.8509	.7919
132	.8694	.7997	.8655	.8037	.8623	.8068
134	.8799	.8147	.8763	.8184	.8733	.8213
136	.8901	.8293	.8866	.8327	.8839	.8354
138	.8998	.8434	.8966	.8466	.8941	.8491
140	.9090	.8570	.9061	.8600	.9038	.8623
142	.9178	.8702	.9152	.8729	.9130	.8750
144	.9262	.8828	.9238	.8853	.9218	.8872
146	.9342	.8949	.9320	.8971	.9302	.8988
148	.9417	.9064	.9397	.9084	.9381	.9099
150	.9487	.9173	.9469	.9191	.9455	.9204
152	.9553	.9276	.9538	.9292	.9525	.9304
154	.9617	.9373	.9601	.9387	.9590	.9398
156	.9671	.9464	.9660	.9476	.9651	.9485
158	.9724	.9548	.9714	.9558	.9706	.9566
160	.9772	.9625	.9763	.9633	.9757	.9640
162	.9815	.9696	.9806	.9702	.9803	.9707
164	.9854	.9759	.9848	.9764	.9844	.9767
166	.9888	.9815	.9884	.9819	.9881	.9822
168	.9918	.9864	.9913	.9867	.9912	.9869
170	.9943	.9905	.9941	.9908	.9939	.9909
172	.9963	.9939	.9962	.9940	.9961	.9942
174	.9979	.9966	.9979	.9967	.9978	.9967
176	.9990	.9985	.9990	.9985	.9990	.9985
178	.9998	.9996	.9997	.9996	.9097	.9996
130	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

This table should be useful for engine timing and for port design in two-cycle engines. The quantities are expressed in fractions of the stroke.

RACING OF MOTOR AT HIGH SPEEDS

Experiments were conducted by S. F. Edge at the Brooklands (England) track to determine whether the motor of an automobile "races" through the road (driving) wheels leaving the ground on rough roads and at high speeds. A Napier car was used. With high gear engaged, the car was towed a complete lap of the Brooklands track, a distance of approximately 2⅝ miles, and the number of revolutions of the motor was found to be 3,372. Towing was effected following the 50-foot line of the track and the subsequent tests of the car under its own power were made on or about this line. Following is a tabulated result of the several tests:

Test	Distance (about 2⅝ miles)	Speed in Miles per Hour	Engine Revolutions	Total Slip (in Engine Revs.)
1	1 lap 2⅝ miles	Car towed	3,732	
2	1 lap 2⅝ miles	Driven very slow speed	3,748	16
3	1 lap 2⅝ miles	Driven 20	3,776	44
4	1 lap 2⅝ miles	Driven 30	3,772	40
5	1 lap 2⅝ miles	Driven 40	3,770	38
6	1 lap 2⅝ miles	Driven 50	3,780	58
7	1 lap 2⅝ miles	Driven 60	3,804	72

Index to Tables and Data appears on Pages 23 to 25.

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(Automobile—Motor-Truck—Bicycle—Motor-Cycle)

Also Light Gauge Seamless Steel

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We solicit your orders and, if received, assure you they will have our prompt and careful attention.

THE STANDARD WELDING CO.

ELECTRIC WELDING PIONEERS

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FOR AUTOMOBILE PARTS

TRUE TO PATTERNS
AND OF HIGHEST TENSILE STRENGTH

LARGE CAPACITY
PROMPT DELIVERIES

The right kind of castings for the right kind of car.
Write and let's get together on your requirements.

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DIMENSIONS AND LIFT OF POPPET VALVES FOR A GIVEN SIZE OF OPENING

D = Smaller diameter of valve seat.
d = diameter of piping to which valve opening must correspond.

$$r = \frac{D}{d}$$

FLAT-SEATED VALVES.

For $r = 1$	Lift	$= d \times 0.250 = D \times 0.250.$
" $r = 1.25$	"	$= d \times 0.200 = D \times 0.160.$
" $r = 1.5$	"	$= d \times 0.166 = D \times 0.111.$
" $r = 2$	"	$= d \times 0.125 = D \times 0.162.$
" $r = 2.5$	"	$= d \times 0.100 = D \times 0.040.$

CONE-SEATED VALVES; 45° ANGLE OF CONE.

For $r = 1$	Lift	$= d \times 0.307 = D \times 0.307.$
" $r = 1.25$	"	$= d \times 0.256 = D \times 0.205.$
" $r = 1.5$	"	$= d \times 0.219 = D \times 0.146.$
" $r = 2$	"	$= d \times 0.170 = D \times 0.084.$
" $r = 2.5$	"	$= d \times 0.138 = D \times 0.055.$

It will be noted that cone-seated valves require a lift from one-fifth to one-quarter greater than the corresponding flat-seated valves.

The proportions of lift given in connection with flat-seated valves are geometrically correct. It should, however, be borne in mind that flat-seated valves generally introduce a certain amount of wire drawing of the incoming charge. A slight increase over the theoretically correct lifts should consequently be provided. A definite coefficient cannot be given, as this will depend considerably upon the valve seat and valve chest design as well as upon the proportions of the fillet between valve stem and valve head. The matter is one of personal intuition by the designer; in the best French designs the extra allowance seldom exceeds 25 per cent. of the theoretical lift. It is well to so arrange the contour of the valve and valve chamber profiles that a minimum of lift be required, as this is favorable to silence in running and to flexibility.

FORMULA FOR PISTON VELOCITY

The ratio of connecting rod length to stroke influences the velocity of the piston and the following will hold: Let,

l = eccentricity of crank (half the stroke);
L = length of connecting rod;
v = linear velocity of crank-pin;
θ = crank angle;
S = piston velocity in feet per minute;
r = ratio;

when,

$$r = \frac{l}{L}$$

and,

$$S = v(\sin\theta \times l/2a \sin 2\theta)$$

In the above expression for the piston velocity, all terms higher than 2θ are neglected because of their small value, which affects the result little, and only makes the formula cumbersome.

Index to Tables and Data appears on Pages 23 to 25.

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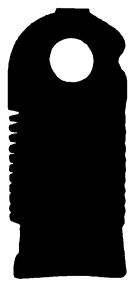
We Make a Specialty of

High-Grade Cylinder Castings

Air and Water Cooled
For Marine, Automobile
and Airship Motors



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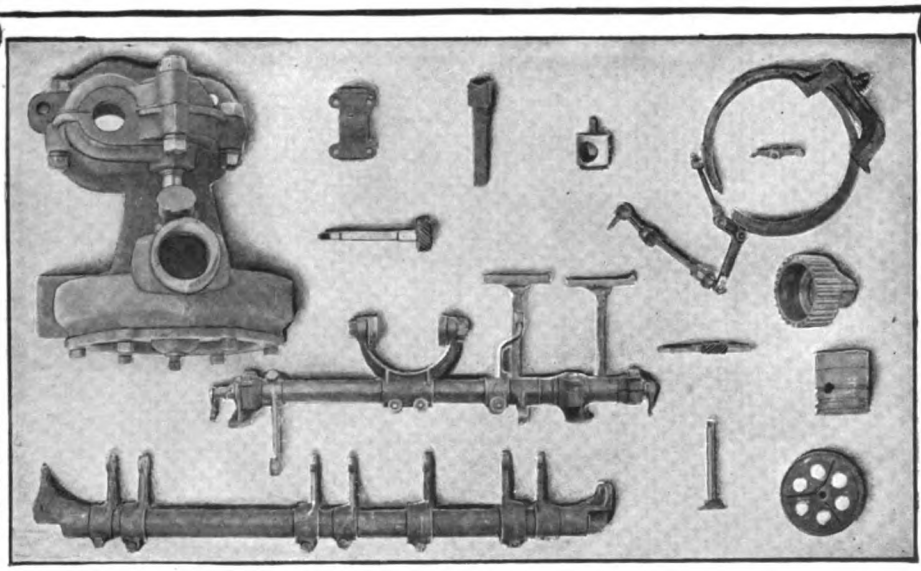
PRATT FOUNDRY CO. **Campello, Mass.**



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OMEGO SEPARATOR COMPANY, - - Lansing, Mich.

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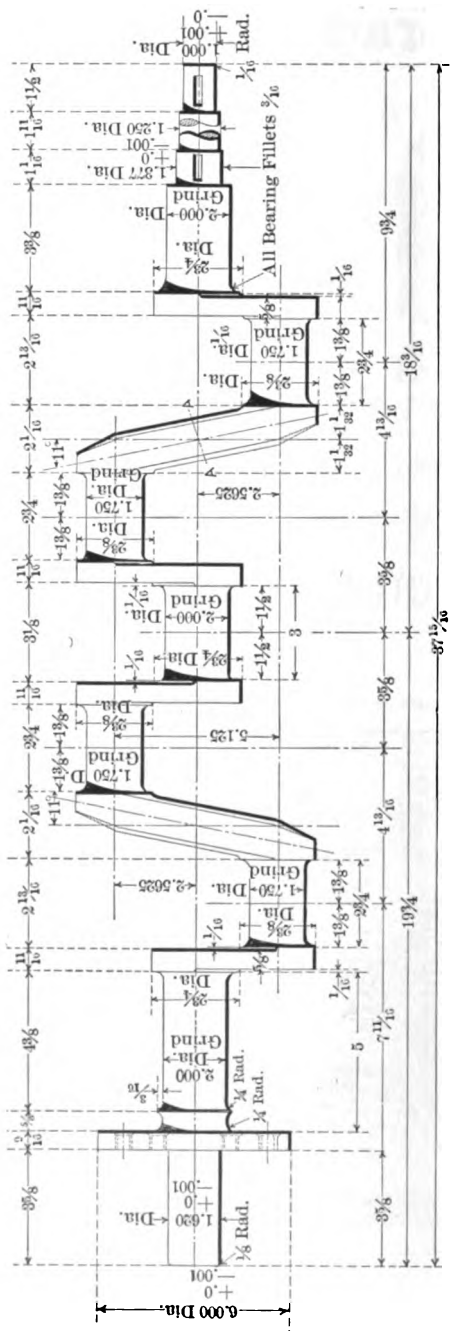
COMPLETELY DIMENSIONED DRAWING OF TYPICAL FOUR-THROW AUTOMOBILE MOTOR CRANK SHAFT



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You can have your Crankshafts made up as you want them, with the assurance of getting absolutely accurate work of the finest kind.

Our Modern Plant, and other facilities, including workmen who are skilled in this kind of work only, guarantees this to you.

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STANDARD GAUGE STEEL CO.

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BEAVER FALLS, PA.

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WORK DONE BY CLUTCH AND BRAKES (C. H. TAYLOR)

Energy absorption of the clutch in accelerating a motor vehicle, assuming the ideal condition of uniform acceleration:

$$W = \frac{MV\,(2Q - FV)}{2(F - Mg\theta)}$$

and

$$w = Q - \frac{FV}{2}$$

$$f = \frac{MV}{F - Mg\,\theta}$$

where W = total energy absorbed by clutch in accelerating the mass M from zero to V ft. per second when coupled with a motor developing Q foot-pounds per second; w = energy per second absorbed by clutch under the above conditions $= \frac{W}{f}$, where f = time required for acceleration in seconds. θ = tangent of the grade angle, or the per cent. of grade; F = accelerative force applied by the propelling system; g = gravity = 32.2. Also.

$$W = MV\left(\frac{Q}{F} - \frac{V}{2}\right)$$

where $\theta = o$ and

$$f = \frac{MV}{F}.$$

Energy required to be absorbed by the brakes when stopping a motor vehicle, on the level, from full speed is equal to

$$E = \frac{MV^2 + Mg\theta fV}{2}$$

$$f = \frac{MV}{F - Mg\theta},$$

using the same symbols as for the clutch formula, but applied to retardation instead of acceleration.

Index to Tables and Data appears on Pages 23 to 25.

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THE STANDARD

Brake Lining

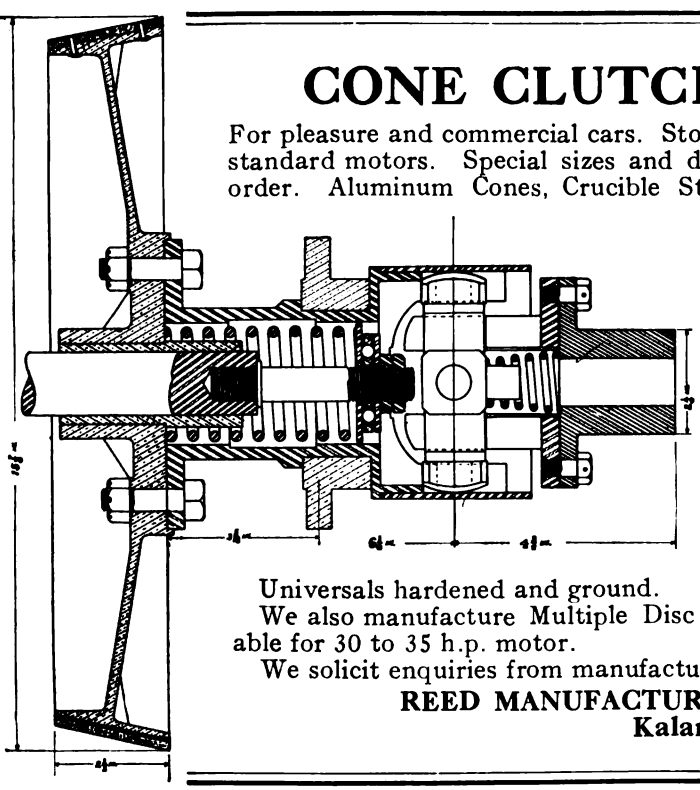
of the Motor Industry is

Thermoid

Manufactured by

THERMOID RUBBER COMPANY

TRENTON, N. J.



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Universals hardened and ground.

We also manufacture Multiple Disc Clutches suitable for 30 to 35 h.p. motor.

We solicit enquiries from manufacturers.

REED MANUFACTURING CO.
Kalamazoo, Mich.

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TRANSMISSION EFFICIENCY OF DIFFERENT TYPES OF MECHANISM (WORBY BEAUMONT)

Source of Loss of Power	Amount of Loss Per Cent.	Efficiency Per Cent.
		100
When driving direct:		
One chain	3.0	....
One and one-half pairs of bearings	7.5	89.5
With epicylic speed gear in operation, add	15.0	74.5
When driving direct:		
One set of gear	5.0	....
Two pairs of bearings	10.0	....
Partially active bearings	3.0	82.0
With change-speed reduction gear in operation, add	12.0	70.0
One set of gear	5.0	....
Three pairs of bearings	15.0	....
Equivalent of two chains	6.0	74.0
Two sets of gear	10.0	....
Four pairs of bearings	20.0	70.0
Two sets of gear	10.0	....
Five pairs of bearings	25.0	....
Equivalent of one chain	3.0	62.0
Equivalent of three sets of gear	15.0	....
Five pairs of bearings	25.0	60.0

TRACTION EFFORT ON VARIOUS SURFACES (NORRIS)

On rails or plates	5.16 pounds per ton
Asphalt or hardwood	12.24 " " "
Macadam	30.60 " " "
Loose gravel	140 to 200 " " "
Sand	400 " " "
With different tires (comparatively):	
Iron	60 " " "
Solid Rubber	60 " " "
Pneumatic	45 " " "

Index to Tables and Data appears on Pages 23 to 25.

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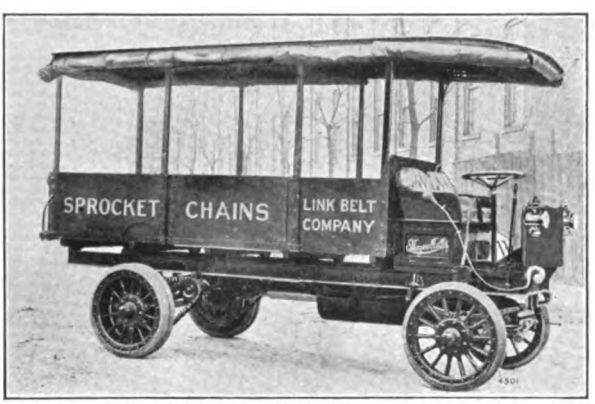
Michigan Crank Shaft Co.

We specialize on complete machining and grinding of crank shafts and have the most completely equipped plant in the state for this class of work. Our factory is situated in

Muskegon, Michigan

"Maximum" Silent Chain



"Maximum" Silent Chain Drives on Frayer-Miller Truck
No intermittent or jerky contact, but a quiet, positive and regular movement that PUTS POWER INTO THE REAR WHEELS.

For SPEED And POWER.

THE PERFECT DRIVE FOR MAGNETOS, PUMPS FANS, CAMS

Our book No. 102-AL will follow your inquiry by next mail.

LINK-BELT COMPANY,

PHILADELPHIA
CHICAGO
INDIANAPOLIS

New York: 299 Broadway
Boston: 84 State Street
Buffalo: 601 Ellicott Sq.

Pittsburgh: 1501-2 Park Bldg.
St. Louis: Central Nat'l Bank Bldg
Seattle: 439-440 N. Y. Block.

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POWER CONSUMED IN MOVING A PLANE SURFACE AT DIFFERENT VELOCITIES IN THE OPEN AIR (KEMPE)

SPEED IN		Horse-power per Square foot of Effective Surface	SPEED IN		Horse-power per Square foot of Effective Surface
Miles per Hour	Feet per Minute		Miles per Hour	Feet per Minute	
10	880	0.013	50	4,400	1.64
15	1,320	0.044	75	6,600	5.54
20	1,760	0.105	100	8,800	13.13
25	2,200	0.205	150	13,200	44.29
30	2,640	0.354	200	17,600	105.00

STRIKING ENERGY OF AUTOMOBILES (DURAND)

Let W = weight of automobile, measured in pounds.
F = average force over the distance required to bring automobile to rest, measured in pounds.
L = distance over which force is exerted to bring automobile to rest, measured in feet
V = velocity in feet per second,

Then Energy $= \dfrac{W V^2}{64.4}$ in foot pounds,

$F L$ = measure of destructive work done in stopping the machine.

Then $$F L = \frac{W V^2}{64.4}$$

$$F = \frac{W V^2}{64.4 L}$$

$$L = \frac{W V^2}{64.4 F}$$

Or, otherwise and more generally, let E be any fraction or amount of energy which is lost in overcoming an average resistance F over a distance L.
Then:

$$E = F L$$
$$F = E \div L$$
$$L = E \div F$$

In the actual case of automobile collision, F, as has been carefully noted, is merely a distance average of the force developed. It means simply that there will be as much destructive work done as would correspond to the exhibition of a force F over a distance L. Actually, the destructive work will be made up of parts, each one of which may consist of a very much larger force, acting through such smaller distance as may be needed for the rupture of the part in question.

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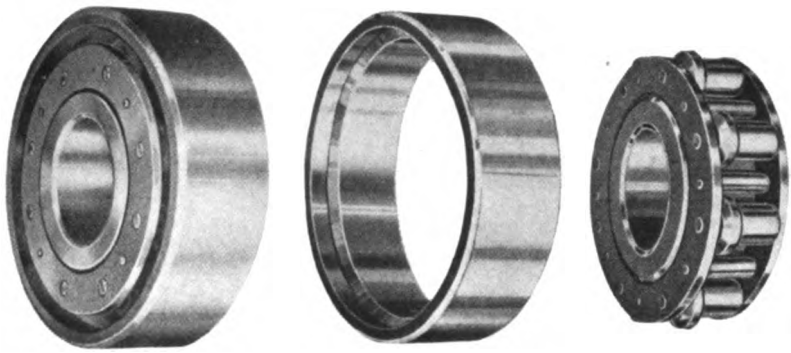

For WHEELS, TRANSMISSIONS, DIFFERENTIALS, JACKSHAFTS, etc.,
The BOWER Bearing has no Superior

- It is not only being used on pleasure cars, but is especially adapted for heavy truck work.
- It is manufactured in sizes to interchange with most all makes of either roller or ball bearings; the value of this is at once apparent.
- Its durability and efficiency are recognized by all engineers and automobile manufacturers.
- Its superior merits, its quality, makes it especially desirable in automobile construction.
- We shall be pleased to have you consult us relative to your requirements; you will find it to your interest to do so.

BOWER ROLLER BEARING CO. Detroit, Mich.

R B F BALL BEARINGS

ARE COMPLETELY FILLED WITH BALLS

Have Greater Capacities than Any Other Bearing

Catalog on request

International Engineering Co., 1779 Broadway, New York

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ALLOWANCES FOR FITS IN AUTOMOBILE CONSTRUCTION

Fits in automobile construction can be divided into,

FORCE FITS.

To be used in parts where disassembling will hardly be required, and which are assembled by means of hydraulic or screw presses, or when hot.

DRIVING FITS.

To be used in parts where close adherence is required, but which must be as embled and disassembled with no other help than an ordinary hammer; such as fly-wheels, gear wheels, ball-bearing inner races, etc.

PUSH FITS.

To be used in parts without relative motion in actual work but which must have sufficient freedom to be assembled by hand; such as bolts, slip joints, ball-bearing outer races, etc.

RUNNING FITS.

To be used in parts possessed of relative motion in normal running; these can be subdivided into,

Easy Fits; where great freedom of running is required with possibility of scant lubrication, such as valve guides, control connections, clutch shafts, etc.

Close Fits ; to be used in all high-speed work and especially the engine and transmission.

Fine Fits ; to be used in parts where great accuracy is required or where, while the motion is slight the stresses are of an alternating or vibratory nature, such as connecting rod small ends, steering connections etc.; efficient lubrication must be provided if the motion is frequently recurring.

FIT ALLOWANCES

In the allowances given in the following the expansion of metals when of different nature or exposed to heat in a different degree, such as is the case in some parts of engine construction, has not been taken into account.

ALLOWANCE OVER NOMINAL DIAMETER FOR FORCE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50100	1.00200	2.00400	3.00600
Minimum "	0.50050	1.00150	2.00300	3.00450

ALLOWANCE OVER NOMINAL DIAMETER FOR DRIVING FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50050	1.00100	1.00125	1.00250
Minimum "	0.50025	1.00075	1.00100	1.00150

ALLOWANCE BELOW NOMINAL DIAMETER FOR PUSH FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49975	0.99950	1.99900	2.99850
Minimum "	0.49925	0.99900	1.99850	2.99800

ALLOWANCE BELOW NOMINAL DIAMETER FOR RUNNING FITS

EASY FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49900	0.99875	1.99825	2.99800
Minimum "	0.49800	0.99725	1.99650	2.99575

CLOSE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59925	0.99900	1.99875	2.99850
Minimum "	0.59875	0.99800	1.99750	2.99700

FINE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59950	0.99925	1.99925	2.99900
Minimum "	0.59925	0.99875	1.99850	2.99800

For intermediate dimensions comparison between the size immediately below and that immediately above will give the safe allowances in each case.

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THE GUARANTEED CELL

Red Seal Dry Batteries are guaranteed to give satisfactory service on any system of gas and gasoline engine ignition or any work for which a dry cell will qualify.

Connect one or more in circuit with other batteries of equal size and note results.

You can pay more for batteries but the quality will not be better.

Round case made in three sizes.

Square case in one size only.

List No			Size	Price
2445	Round Case	A	2½x6¾ in.	$0.25
2446	" "	B	3x7½ "	.35
2447	" "	C	3¼x8½ "	.45
2448	Square "	A	2½x6¾ "	.25

Manhattan Electrical Supply Co.

NEW YORK — **17 Park Place**
CHICAGO — **188 Fifth Ave.**

Automobile Supply Catalogue for the asking

Radium Steam Vulcanizer

For Kerosene or Gas

INVESTIGATE THIS VULCANIZER

Write for our Catalogue

No. 2. List price $35.00

Write for discounts

Simple, perfectly practical and economical.

Will repair 4 tubes or 2 tubes and 2 tires at same time in 20 to 30 minutes.

Heated by kerosene—can be used anywhere.

Steam heat under absolute steady control.

Automatic control makes perfect cure throughout. Heated in 10 minutes.

Guaranteed to give satisfaction.

MILWAUKEE AUTO SPECIALTY CO.

Manufacturers

152 Second St., Milwaukee, Wis.

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ENERGY CONSUMPTION OF COMMERCIAL VEHICLES (CHURCHWARD)

The tractive effort of pneumatic tires on hard level asphalt varies from 15 pounds per ton for special tires designed for electric runabouts up to 35 pounds per ton for the standard type used on gasoline touring cars.

The tractive effort of pneumatic tires is also greatly affected by the air pressure increasing rapidly as the air pressure is reduced.

The tractive effort of solid tires on hard level asphalt varies from 18 pounds to 26 pounds per ton, depending upon:

(1) The diameter of driving wheels.
(2) Revolutions per minute.
(3) Load in pounds, per square inch or pounds per inch width.
(4) Composition of the compound used.
(5) Method of attaching tire to wheel rim.

The tractive effort of a vehicle will vary with the road surface as per table, taking the tractive effort of a vehicle on hard level alphalt as unity.

(1) Level asphalt (hard)	1.00
(2) Wood pavement	1.15
(3) Level macadam	1.15 to 3
(4) Plank road	.9
Cobble stones	1.75
(5) Good dirt road	1.10 to 2
(6) Ordinary country road (dirt)	.2
(7) Sand	.20

The tractive effort due to grades must be added to the tractive effort for a given road surface. Example: 5 per cent. grade on hard level asphalt. Hard level asphalt 25 pounds per ton. 5 per cent. grade = 100 pounds per ton, due to grade alone. 100 + 25 = total tractive effort = 125 pounds per ton, total.

Taking everything into consideration, that is to say, life of engine, transmission, tires and maintenance of vehicle as a whole, experience shows that the following table of economic speeds is approximately correct:

Gross Weight	Type of Tires	Speed in M.P.H.
1,500 lbs.	Pneumatic	20
2,000 "	"	20
3,000 "	"	18
4,000 "	"	16
2,000 "	Solid	16
3,000 "	"	15
4,000 "	"	13
5,000 "	"	11
7,000 "	"	9
10,000 "	"	8
15,000 "	"	7
20,000 "	"	6

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ADAMS TRUCKS

Adams Model "A" One Ton Truck
4 Cylinder, 4 Cycle, 30 h. p., $3\frac{3}{4}$ Bore, 5 in. Stroke. Selective Type Transmission, Left Hand Steer, Center Control, 120 in. Wheel Base.
Complete with Body : : : $2150.00

Adams Model "B" 1000 lb. Delivery Wagon
2 Cylinder, 4 Cycle, 16 h. p., $3\frac{7}{8}$ Bore, 5 in. Stroke, Selective Type Transmission, Left Hand Steer, Center Control, 104 in. Wheel Base.
Complete with Body : : : $1650.00

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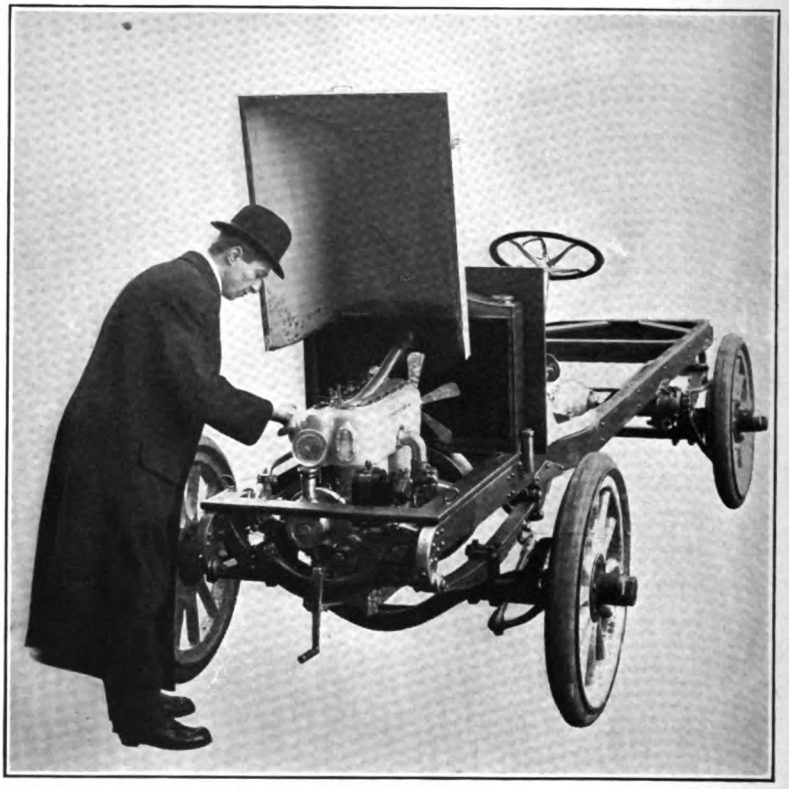
ADAMS MOTOR



Not only Accessible, but SIMPLE, SUBSTANTIAL and EFFICIENT. Every inch a truck.

Dealers: Here is a line of Trucks and Delivery Wagons that will pay you to investigate.

The simplicity immediately appeals to your prospective customer.

CATALOGUE UPON APPLICATION

Established 1867

THE ADAMS BROS. CO.

Findlay, Ohio

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BUILD MOTOR TRUCKS AND DELIVERY WAGONS

WE FURNISH

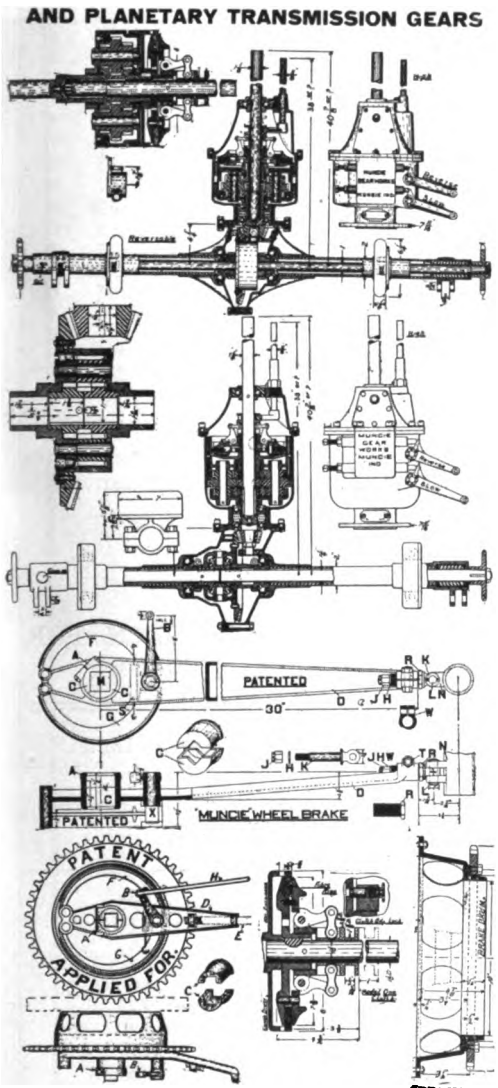
COMPLETE TRANSMISSION JACK SHAFTS

REAR WHEEL BRAKES

BRAKE DRUMS WITH SPROCKETS

DIFFERENTIALS

AND PLANETARY TRANSMISSION GEARS

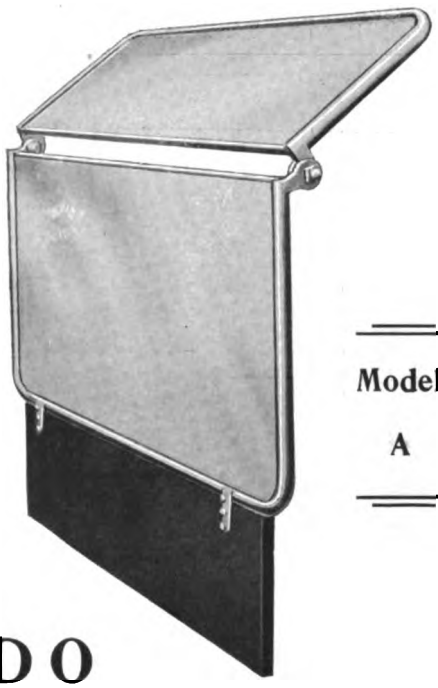


MUNCIE GEAR WORKS

MUNCIE, IND.

H. L. WARNER, Manager.

Successors to High Wheel Auto Parts Co.



Model

A

DO

YOU

want to equip your cars with SHIELDS that hold the high efficiency of standard quality? If you are interested write us and we will ship you any of our models prepaid for your inspection.

All SHIELDS GUARANTEED.

Peerless Windshield Co.

BUFFALO, N. Y.

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PRINCIPAL OVERALL DIMENSIONS OF TYPICAL MODERN CARS

H.P.	Type—Remarks	Wheelbase		Length		Width		Height	
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
14–16	Side entrance	8	4	12	6	5	2	5	3
14–16	Side entrance (hood up)	8	4	12	6	5	2	7	5
14–16	Side entrance (hood folded)	8	4	13	6	5	2	5	6
14–16	Single landaulette	9	0	13	0	5	2	7	0
14–16	Limousine	9	0	13	0	5	2	7	0
14–16	City carriage	6	10	10	8	5	5	7	4
16–20	Side entrance	9	0	13	0	5	3	5	5
16–20	Side entrance (hood up)	9	0	13	0	5	3	7	7
16–20	Side entrance (hood folded)	9	0	14	0	5	3	5	8
16–20	Seven-seater side entrance	9	9	13	10	5	3	5	5
16–20	Three-quarter landaulette	9	9	13	10	5	3	7	7
16–20	Limousine	9	9	13	10	5	3	7	7
26–30	Side entrance	9	3	13	4	5	7	5	5
26–30	Side entrance (hood up)	9	3	13	4	5	7	7	7
26–30	Side entrance (hood folded)	9	3	14	4	5	7	5	8
26–30	Three-quarter landaulette	10	0	14	1	5	5	7	8
26–30	Limousine	10	0	14	1	5	7	7	8
40	Side entrance	9	8	13	8	6	0	5	6
40	Side entrance (hood up)	9	8	13	8	6	0	7	8
40	Side entrance (hood folded)	9	8	14	8	6	0	5	9
40	Seven-seater side entrance	10	4	14	4	6	0	5	6
40	Three-quarter landaulette	10	4	14	4	6	0	7	8
40	Limousine	10	4	14	4	6	0	7	8

N.B.—In some cases the lamps mean a further increase in length.

From these figures it is possible to deduce the fact that the average additive quantity which the car projects beyond the centers of the wheels is 4 feet 4½ inches. Taking this at 4 feet 6 inches, it is possible to compute the overall length of any car.

COMPRESSION PRESSURE IN POUNDS PER SQUARE INCH FOR VARIOUS PERCENTAGES OF COMBUSTION SPACE VOLUME

Combustion Chamber, Percentage of Piston Displacement	Compression Pressures in Pounds per Square Inch Gauge Pressure		
	High Value	Average Value	Low Value
25	125	112	97
26	118	107	92
27	113	102	88
28	108	97	84
29	103	93	80
30	99	89	77
31	95	86	74
32	92	83	71
33	89	80	68
34	86	77	66
35	83	74	64
36	80	72	62
37	77	70	60
38	74	68	58
39	72	66	56
40	70	64	55

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"R. I. V."

MARKED ON A

Ball Bearing

Means:

That it is Imported.

That the materials are absolutely Superior.

That the workmanship is unexcelled.

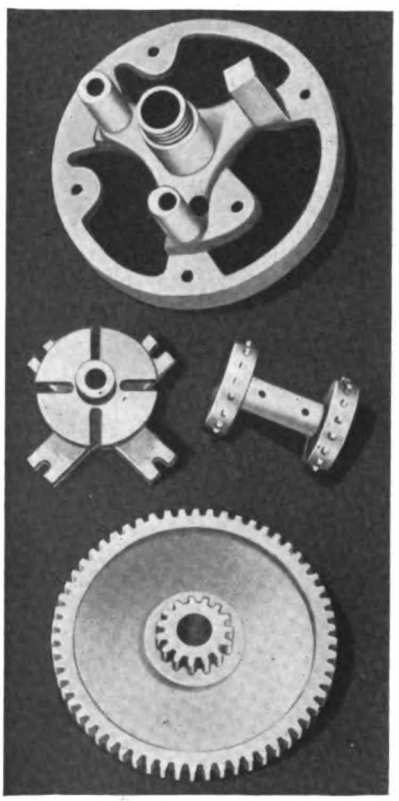
That these cardinal facts are recognizable wherever

Quality, Durability and Satisfaction are desired.

R. I. V. Company
1771 Broadway, New York
DETROIT

Precision

Die-Cast Parts and Engine Bearings



All threads, holes, lugs and irregularly shaped milling cuts finished to accurate size in the operation of casting. Parts are ready for assembling when taken from the mould.

Precision Die-Cast Bearings

made from Precision Babbitt or other makes of Babbitt or White Brass as specified. Send sample part or blue print (both if convenient) when requesting quotations. Write for Descriptive Booklet.

Precision Die-Casting Co.
420 So. West St. Syracuse, N. Y.

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REVOLUTIONS PER MINUTE OF AUTO ROAD WHEELS AT DIFFERENT RATES OF SPEED

Miles per hour		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40
Feet per minute		88	176	264	352	440	528	616	704	792	880	968	1,056	1,144	1,232	1,320	1,418	1,496	1,584	1,672	1,760	....	1,936	....	2,112	....	2,288	....	2,464	....	2,640	3,080	3,520
WHEEL DIAMETER	12	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	....	616	....	672	....	728	....	784	....	840	980	1.120
	14	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	....	528	....	576	....	624	....	672	....	720	840	960
	16	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	....	462	....	504	....	546	....	588	....	630	735	840
	18	18.66	37.33	56	72.66	93.33	112	130.66	145.33	168	186.66	203.33	224	242.66	161.33	280	298.66	317.33	336	354.66	373.33	....	410.66	....	448	....	485.33	....	522.66	....	560	653.33	746.66
	20	16.8	32.6	50.4	67.2	84	100.8	117.6	134.4	151.2	168	184.8	201.6	218.4	235.2	252	268.8	285.6	302.4	319.2	336	....	369.6	....	403.2	....	436.8	....	470.4	....	504	588	672
	22	15.27	30.54	45.81	61.09	76.36	91.63	106.90	122.18	137.45	152.72	168	183.27	198.54	213.81	229.09	244.36	259.63	274.90	290.18	305.45	....	336	....	366.54	....	397.09	....	427.63	....	458.18	534.54	611.09
	24	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	....	308	....	336	....	364	....	392	....	420	490	560
	26	12.92	21.84	38.76	51.69	63.61	77.53	90.46	103.38	116.30	129.23	142.15	155.07	168	180.92	193.84	206.76	219.69	232.61	245.53	258.46	....	284.30	....	310.15	....	336	....	361.84	....	397.69	452.30	516.92
	28	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	....	264	....	288	....	312	....	336	....	360	420	480
	30	11.2	22.4	33.6	44.8	56	67.2	78.4	89.6	100.8	112	123.2	134.4	145.6	156.8	168	179.2	190.4	201.6	212.8	224	....	246.4	....	268.8	....	291.2	....	313.6	....	336	392	448
	32	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105	115.5	126	136.5	147	157.5	168	178.5	189	199.5	210	....	231	....	252	....	273	....	294	....	315	367.5	420
	34	9.88	19.76	29.64	39.52	49.41	59.29	69.17	79.05	88.94	98.82	108.70	118.58	128.47	138.35	148.23	158.11	168	177.88	187.76	197.64	....	217.41	....	237	....	256.94	....	276.70	....	296.47	345.88	395.29
	36	9.33	18.66	28	37.33	46.66	56	65.33	74.66	84	93.33	102.66	112	121.33	130.66	140	149.33	158.66	168	177.33	186.66	....	205.33	....	224	....	242.66	....	261.33	....	280	326.66	373.33
	38	8.8	17.68	26.52	35.36	44.21	53.05	61.89	70.73	79.57	88.42	97.27	106.10	114.94	123.78	132.63	141.47	150.31	159.15	168	176.84	....	194.52	....	212.21	....	238.89	....	247.57	....	265.26	309.21	353.42
	40	8.4	16.8	25.2	33.6	42	50.4	58.8	67.2	75.6	84	92.4	100.8	109.2	117.6	126	134.4	142.8	151.2	159.6	168	....	184.8	....	201.6	....	218.4	....	235.2	....	252	294	336
	42	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	....	176	....	192	....	208	....	224	....	240	280	320
	44	7.63	15.27	22.10	30.54	38.18	45.81	53.45	61.09	68.72	76.36	84	91.63	99.27	106.10	114.54	122.18	129.81	137.45	145.09	156.73	....	168	....	183.27	....	198.54	....	213.81	....	229.09	267.27	305.45

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Here is a Speedometer You should consider—

Before you place any further orders let us demonstrate the new

Casgrain

SPEEDOMETER

To Owners—we will furnish a Casgrain on 30 days' trial. Pay when you know it is the speedometer you want. Write for details of this offer.

To Manufacturers—let us supply a Casgrain to you for testing purposes. We know it will prove every claim we make.

The Casgrain is guaranteed "for all time." It is the only speedometer with a figure for every mile.

AUTOMATIC APPLIANCE CO.

1919 Broadway, New York, N. Y.
167-172 Columbus Ave., Boston, Mass
2031 Euclid Avenue, Cleveland, O.

FORSE SPEEDOMETER

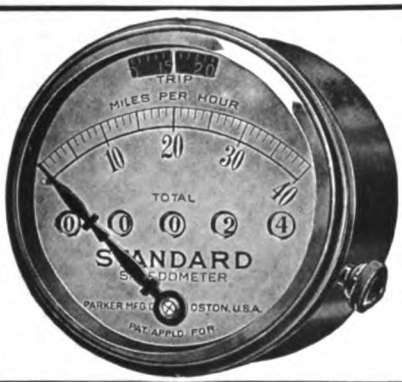
is the only Speed Indicator having **all** these good features: Instantaneous (single movement) trip re-set. 60-mile speed dial on the low-priced models. Steady indicating hand. Plain figures easily read. No delicate hair-springs in speedometer or odometer movement.

Guaranteed Accurate and Durable

Satin-Buffed Case. French Beveled Glass. Fine Finish.

THE FORSE MANUFACTURING CO.,
ANDERSON, IND.

Model A, $20.00, is illustrated.
Other models at $15.00 and $25.00.



THE STANDARD SPEEDOMETER

(TRADE MARK)

Has more valuable and up-to-date features than any other instrument at any price; namely:
Indicates accurately speeds from zero up.
Can be attached to either wheel.
Indicates speed and mileage when backing.
Trip Odometer can be sent forward or back.
It is equipped with our universal pivot joint.
Correct driving gear ratio for all wheels.

PRICES:

3	inch	40	mile	$25.00	4	inch	80	mile	$50.00
3	"	60	"	$30.00	3	"	Clock	Set	$75.00
4	"	60	"	$40.00	4	"	"	"	$90.00

Standard Thermometer Co., 65 Shirley St., Boston, Mass.

Successors to Parker Mfg. Co.

A SPECIALTY OF OURS
AND YOU WILL FIND

"B.I.W." CABLE THE BEST

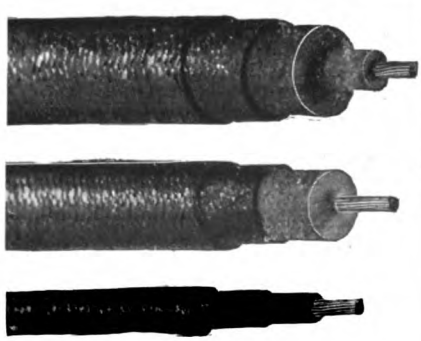
SECONDARY, ½, 7/16 and ⅜ inch diam.
PRIMARY, 1, 2, 3 and 4 conductors.
THE BRAID IS THOROUGHLY

OIL-PROOFED Protecting the Rubber

WIRES AND CORDS FOR LIGHTING

Samples for Trial Gladly Furnished

BOSTON INSULATED WIRE & CABLE CO.
BOSTON, MASS.



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MOTOR BOAT MEASURED MILE SPEED TABLE

ELAPSED TIME) IN NAUTICAL MILES (ADMIRALTY KNOT = 6,080 FEET) AND STATUTE MILES (5,280 FEET) FROM 1 MIN. TO 8 MIN. 59 SEC., PROGRESSIVELY BY SECONDS. FOR SLOWER SPEEDS DIVIDE ELAPSED TIME BY 2 AND DIVIDE RESULT BY 2.

Seconds	1 Minute	Equivalent in Miles	2 Minutes	Equivalent in Miles	3 Minutes	Equivalent in Miles	4 Minutes	Equivalent in Miles	5 Minutes	Equivalent in Miles	6 Minutes	Equivalent in Miles	7 Minutes	Equivalent in Miles	8 Minutes	Equivalent in Miles
0	60.00	69.06	30.00	34.54	20.00	23.03	15.00	17.27	12.00	13.81	10.00	11.51	8.57	9.86	7.50	8.63
1	59.01	67.95	29.75	34.25	19.89	22.90	14.93	17.20	11.96	13.77	9.97	11.48	8.55	9.84	7.48	8.61
2	58.06	66.86	29.50	33.97	19.78	22.88	14.87	17.12	11.92	13.72	9.94	11.45	8.53	9.82	7.46	8.60
3	57.14	65.80	29 26	33.70	19.67	22.65	14.81	17.05	11.88	13.68	9.91	11.41	8.51	9.80	7.45	8.58
4	56.25	64.77	29.03	33.43	19.56	22.52	14.75	16.98	11.84	13.63	9.89	11.38	8.49	9.77	7.43	8.56
5	55.38	63.77	28.80	33.16	19.45	22.40	14.69	16.92	11.80	13.59	9.86	11.35	8.47	9.75	7.42	8.54
6	54.54	62.80	28.57	32.89	19.35	22.28	14.63	16.85	11.76	13.54	9.83	11.32	8.45	9.73	7.40	8.52
7	53.73	61.87	28.34	32.64	19.25	22.16	14.57	16.78	11.72	13.50	9.80	11.29	8.43	9.70	7.39	8.51
8	52.94	60.96	28.12	32.38	19.14	22.05	14.51	16.71	11.68	13.45	9.78	11.26	8.41	9.68	7.37	8.49
9	52.17	60.07	27.90	32.13	19.04	21.93	14.45	16.64	11 65	13.41	9.75	11.23	8.39	9.66	7.36	8.47
10	51.42	59.21	27.69	31.88	18.94	21.81	14.40	16.58	11.61	13.37	9.73	11.20	8.37	9.64	7.34	8.46
11	50.70	58.38	27.48	31.64	18.84	21.70	14.34	16.51	11.57	13.32	9.70	11.17	8.35	9.61	7.33	8.44
12	50.00	57.57	27.27	31.40	18.75	21.59	14.28	16.45	11.53	13.28	9.67	11.14	8.33	9.59	7.31	8.42
13	49.31	56.78	27.06	31.16	18.65	21.47	14.22	16.38	11.50	13.24	9.65	11.11	8.31	9.57	7.30	8.40
14	48.64	56.01	26.86	30.83	18.55	21.36	14.17	16.32	11.46	13.20	9.62	11.08	8.29	9.55	7.28	8.39
15	48.00	55.27	26.66	30.70	18.46	21.25	14.11	16.25	11.42	13.16	9.60	11.05	8.27	9.52	7.27	8.37
16	47.36	54.54	26.47	30.48	18.36	21.14	14.06	16.19	11.39	13.11	9.57	11.02	8.25	9.50	7.25	8.35
17	46.75	53.83	26.27	30.25	18.27	21.04	14.00	16.13	11.35	13.07	9.54	10.99	8.23	9.48	7.24	8.34
18	46.15	53.14	26.08	30.03	18.18	20.93	13.95	16.06	11.32	13.02	9.52	10.96	8.21	9.46	7.22	8.32
19	45.57	52.47	25.89	29.82	18.09	20.83	13.90	16.00	11.28	12.99	9.49	10.93	8.20	9.44	7.21	8.30
20	45.00	51.81	25.71	29.40	18.00	20.72	13.84	15.94	11.25	12.95	9.47	10.90	8.18	9.42	7.20	8.29
21	44.44	51.17	25.53	29.39	17.91	20.62	13.79	15.88	11.21	12.91	9.44	10.88	8.16	9.39	7.18	8.27
22	43.90	50.55	25.35	29.17	17.82	20.52	13.74	15.82	11.18	12.87	9.42	10.85	8.14	9.37	7.17	8.25
23	43.37	49.94	25.17	28.98	17.73	20.42	13.68	15.76	11.14	12.83	9.39	10.82	8.12	9.35	7.15	8.24
24	42.85	49.34	25.00	28.78	17.64	20.32	13.63	15.70	11.11	12.79	9.37	10.79	8.10	9.33	7.14	8.22
25	42.35	48.76	24.82	28.58	17.56	20.22	13.58	15.64	11.07	12.75	9.35	10.76	8.09	9.31	7.12	8.20
26	41.86	48.20	24.65	28.39	17.47	20.12	13.53	15.58	11.04	12.71	9.32	10.73	8.07	9.29	7.11	8.19
27	41.37	47.64	24.49	28.20	17.39	20.02	13.48	15.52	11.00	12.67	9.30	10.71	8.05	9.27	7.10	8.17
28	40.90	47.10	24.32	28.00	17.30	19.93	13.43	15.46	10.97	12.63	9.27	10.68	8.03	9.25	7.08	8.16
29	40.45	46.57	24.16	27.82	17.22	19.83	13.38	15.41	10.94	12.59	9.25	10.65	8.01	9.23	7.07	8.14
30	40.00	46.06	24.00	27.63	17.14	19.74	13.33	15.35	10.90	12.56	9.23	10.62	8.00	9.21	7.05	8.12
31	39.56	45.55	23.84	27.45	17.06	19.64	13.28	15.29	10.87	12.52	9.20	10.60	7.98	9.19	7.04	8.11
32	39.13	45.05	23.68	27.27	16.98	19.54	13.23	15.24	10.84	12.48	9.18	10.57	7.96	9.17	7.03	8.09
33	38.71	44.57	23.52	27.09	16.90	19.46	13.18	15.18	10.81	12.44	9.16	10.54	7.94	9.15	7.01	8.08
34	38.29	44.10	23.37	26.91	16.82	19.37	13.13	15.12	10.77	12.41	9.13	10.52	7.93	9.13	7.00	8.06
35	37.89	43.63	23.22	26.74	16.74	19.28	13.09	15.07	10.74	12.37	9.11	10.49	7.91	9.11	6.99	8.04
36	37.50	43.18	23.07	26.57	16.66	19.19	13.04	15.01	10.71	12.33	9.09	10.46	7.89	9.09	6.97	8.03
37	37.11	42.73	22.93	26.40	16.59	19.10	12.99	14.96	10.68	12.30	9.06	10.44	7.87	9.07	6.96	8.01
38	36.73	42.30	22.78	26.23	16.51	19.01	12.95	14.91	10.65	12.26	9.04	10.41	7.86	9.05	6.95	8.00
39	36.36	41.87	22.64	26.07	16.43	18.92	12.90	14.85	10.61	12.22	9.02	10.38	7.84	9.03	6.93	7.98
40	36.00	41.45	22.50	25.90	16.36	18.84	12.85	14.80	10.58	12.19	9.00	10.36	7.82	9.01	6.92	7.97
41	35.64	41.04	22.36	25.74	16.29	18.75	12.81	14.75	10.55	12.15	8.97	10.33	7.80	8.99	6.91	7.95
42	35.29	40.64	22.22	25.58	16.21	18.67	12.76	14.70	10.52	12.12	8.95	10.31	7.79	8.97	6.89	7.94
43	34.95	40.24	22.08	25.43	16.14	18.58	12.72	14.64	10.49	12.08	8.93	10.28	7.77	8.95	6.88	7.92
44	34.61	39.85	21.95	25.27	16.07	18.50	12.67	14.59	10.46	12.05	8.91	10.26	7.75	8.93	6.87	7.91
45	34.28	39.48	21.81	25.12	16.00	18.42	12.63	14.54	10.43	12.01	8.88	10.23	7.74	8.91	6.85	7.89
46	33.96	39.10	21.68	24.97	15.92	18.34	12.58	14.49	10.40	11.98	8.86	10.21	7.72	8.89	6.84	7.88
47	33.64	38.74	21.55	24.82	15.85	18.26	12.54	14.44	10.37	11.94	8.84	10.18	7.70	8.87	6.83	7.86
48	33.33	38.38	21.42	24.67	15.78	18.18	12.50	14.39	10.34	11.91	8.82	10.16	7.69	8.85	6.81	7.84
49	33.02	38.03	21.30	24.52	15.72	18.10	12.45	14.34	10.31	11.87	8.80	10.13	7.67	8.83	6.80	7.83
50	32.72	37.68	21.17	24.38	15.65	18.02	12.41	14.29	10.28	11.84	8.78	10.11	7.66	8.82	6.79	7.82
51	32.43	37.34	21.05	24.24	15.58	17.94	12.37	14.24	10.25	11.80	8.75	10.08	7.64	8.80	6.78	7.80
52	32.14	37.01	20.93	24.10	15.51	17.86	12.32	14.19	10.22	11.77	8.73	10.06	7.62	8.78	6.76	7.79
53	31.85	36.68	20.80	23.96	15.45	17.79	12.28	14.14	10.19	11.74	8.71	10.03	7.61	8.76	6.75	7.77
54	31.57	36.36	20.69	23.82	15.38	17.71	12.24	14.10	10.16	11.70	8.69	10.01	7.59	8.74	6.74	7.76
55	31.30	36.08	20.57	23.68	15.31	17.63	12.20	14.05	10.14	11.67	8.67	9.98	7.57	8.72	6.72	7.74
56	31.03	35.73	20.45	23.55	15.25	17.56	12.16	14.00	10.11	11.64	8.65	9.96	7.56	8.70	6.71	7.73
57	30.76	35.43	20.33	23.42	15.19	17.49	12.12	13.95	10.08	11.61	8.63	9.94	7.54	8.69	6.70	7.72
58	30.50	35.12	20.22	23.28	15.12	17.41	12.08	13.28	10.05	11.57	8.61	9.91	7.53	8.67	6.69	7.70
59	30.25	34.83	20.11	23.16	15.06	17.34	12.04	13.86	10.02	11.54	8.59	9.89	7.51	8.65	6.68	7.69

Index to Tables and Data appears on Pages 23 to 25.

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"BEST" BRAKE LINING

Gives the maximum gripping effect. Does not soften or become hard. Impervious to oil and water.

The Multiple Woven Hose and Rubber Company
Worcester, Mass.

"METAL STAMPINGS"

Pressed Rear Hood Supports.
Dash and Running Board Moulding.

LIGHT STAMPINGS OF ALL KINDS TO ORDER.

"GIVE US AN OPPORTUNITY TO QUOTE YOU."

The Metal Specialty Co., Cincinnati, Ohio

E. C. BLISS MANUFACTURING CO.

MANUFACTURERS OF

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PLAIN AND FANCY LETTERS AND FIGURES

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STEEL HARDENING AND TEMPERING — **91 SABIN ST.** — BUILDERS OF SPECIAL MACHINERY

PROVIDENCE, R. I., U. S. A.

STEEL, BRASS, COPPER AND FIBRE WASHERS, METAL STAMPINGS, COPPER GASKETS

Our equipment is up-to-date and of such size as to do work quickly. Let us figure on your requirements.

The Bettcher Manufacturing Co.
CLEVELAND, OHIO

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RATE OF SPEED IN MILES PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE FROM ONE TO THREE MINUTES

Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour
Min.	*Sec.*		*Min.*	*Sec.*		*Min.*	*Sec.*	
1	0	60.00	1	27	41.38	1	54	31.58
1	1	59.00	1	28	40.91	1	55	31.30
1	2	58.06	1	29	40.45	1	56	31.03
1	3	57.14	1	30	40.00	1	57	30.77
1	4	56.25	1	31	39.56	1	58	30.50
1	5	55.38	1	32	39.13	1	59	30.25
1	6	54.54	1	33	38.71	2	0	30.00
1	7	53.73	1	34	38.29	2	3	29.26
1	8	52.94	1	35	37.89	2	6	28.57
1	9	52.17	1	36	37.50	2	9	27.90
1	10	51.42	1	37	37.11	2	12	27.27
1	11	50.70	1	38	36.73	2	15	26.66
1	12	50.00	1	39	36.36	2	18	26.08
1	13	49.31	1	40	36.00	2	21	25.53
1	14	48.65	1	41	35.64	2	24	25.00
1	15	48.00	1	42	35.29	2	27	24.49
1	16	47.37	1	43	34.95	2	30	24.00
1	17	46.75	1	44	34.61	2	33	23.53
1	18	46.15	1	45	34.28	2	36	23.07
1	19	45.57	1	46	33.96	2	39	22.64
1	20	45.00	1	47	33.64	2	42	22.22
1	21	44.44	1	48	33.33	2	45	21.81
1	22	43.90	1	49	33.03	2	48	21.42
1	23	43.37	1	50	32.72	2	51	21.05
1	24	42.85	1	51	32.43	2	54	20.69
1	25	42.35	1	52	32.14	3	0	20.00
1	26	41.86	1	53	31.86	..	..	.....

SPEED FORMULA

To reduce *A* miles in *B* seconds to miles per hour,

$$A \times \frac{3600}{B} = \text{miles per hour.}$$

SPEED EQUIVALENTS IN AMERICAN AND FRENCH MEASUREMENTS

1 mile per hour = 88 ft. per minute.
= 1.46 ft. per second.
= 27.8 metres per minute.
= 0.463 metre per second.
1 km. per hour = 0.624 miles per hour.
= 54.9 ft. per minute.
= 0.914 metre per second.

Index to Tables and Data appears on Pages 23 to 25.

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CENTURY TIRES

"Custom Made"

Mere outward examination will reveal little of the real merits of a tire. If the tires you are using are not backed by a guarantee such as ours you are not getting that to which your financial outlay entitles you.

CENTURY guarantees you against loss. It's a money-back guarantee. We couldn't do that if we didn't know what our tires will do.

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both

Pleasure and Commercial

The Auto Wheel Company
LANSING MICH.

STEEL CUSHION TIRE

(without rubber)

For Commercial and Pleasure Motor Vehicles

The Tire That solves the problem.
The Tire That has come to stay.
The Tire That can't puncture.
The Tire That can't blow out.
The Tire That can't stall your car.
The Tire That saves your engine.
The Tire That rides like a pneumatic Tire.

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MARBRIDGE BLDG.
Broadway and 34th Street
NEW YORK

112 Water Street, Boston

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REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 24 SECONDS PROGRESSIVELY BY 15-SECOND TO 59 4-5 SECONDS

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
24	150.00	241.54	24	150.00	93.15
1/5	148.76	239.55	1/5	148.76	92.38
2/5	147.54	237.58	2/5	147.54	91.62
3/5	146.34	235.65	3/5	146.34	90.87
4/5	145.16	233.75	4/5	145.16	90.14
25	144.00	231.88	25	144.00	89.42
1/5	142.86	230.05	1/5	142.86	88.71
2/5	141.73	228.23	2/5	141.73	88.01
3/5	140.62	226.44	3/5	140.62	87.32
4/5	139.53	224.67	4/5	139.53	86.64
26	138.46	222.96	26	138.46	85.98
1/5	137.40	221.25	1/5	137.40	85.32
2/5	136.36	219.58	2/5	136.36	84.68
3/5	135.34	217.94	3/5	135.34	84.04
4/5	134.33	216.31	4/5	134.33	83.42
27	133.33	214.70	27	133.33	82.80
1/5	132.35	213.12	1/5	132.35	82.19
2/5	131.38	211.56	2/5	131.38	81.58
3/5	130.43	210.03	3/5	130.43	80.10
4/5	129.50	208.53	4/5	129.50	80.42
28	128.57	207.03	28	128.57	79.84
1/5	127.66	205.57	1/5	127.66	79.27
2/5	126.76	204.12	2/5	126.76	78.71
3/5	125.87	202.69	3/5	125.87	78.16
4/5	125.00	201.29	4/5	125.00	77.62
29	124.13	199.88	29	124.13	77.08
1/5	123.28	198.52	1/5	123.28	76.55
2/5	122.45	197.18	2/5	122.45	76.04
3/5	121.62	195.84	3/5	121.62	75.52
4/5	120.80	194.52	4/5	120.80	75.01
30	120.00	193.23	30	120.00	74.52
1/5	119.20	191.95	1/5	119.20	74.02
2/5	118.42	190.69	2/5	118.42	73.54
3/5	117.64	189.43	3/5	117.64	73.05
4/5	116.88	188.21	4/5	116.88	72.58
31	116.13	187.00	31	116.13	72.11
1/5	115.38	185.79	1/5	115.38	71.65
2/5	114.65	184.62	2/5	114.65	71.20
3/5	113.90	183.41	3/5	113 90	70.73
4/5	113.21	182.28	4/5	113.21	70.30
32	112.50	181.16	32	112.50	69.86
1/5	111.80	180.03	1/5	111.80	69.43
2/5	111.11	178.92	2/5	111.11	69.00
3/5	110.43	177.82	3/5	110.43	68.57
4/5	109.75	176.73	4/5	109.75	68.15
33	109.09	175.67	33	109.09	67.74
1/5	108.43	174.60	1/5	108.43	67.33
2/5	107.78	173.56	2/5	107.78	66.93
3/5	107.14	172.53	3/5	107.14	66.53
4/5	106.51	171.51	4/5	106.51	66.14
34	105.88	170.50	34	105.88	65.75
1/5	105.26	169.50	1/5	105.26	65.36
2/5	104.65	168.52	2/5	104.65	64.98
3/5	104.04	167 53	3/5	104.04	64.61
4/5	103.45	166.58	4/5	103.45	64.24

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour
35	102.85	165.62	35	102.85	63.87
1/5	102.27	164.68	1/5	102.27	63.51
2/5	101.69	163.75	2/5	101.69	63.15
3/5	101.12	162.83	3/5	101.12	62.79
4/5	100.56	161.93	4/5	100.56	62.44
36	100.00	161.03	36	100.00	62.10
1/5	99.44	160.13	1/5	99.44	61.75
2/5	98.90	159.26	2/5	98.90	61.41
3/5	98.36	158.39	3/5	98.36	61.08
4/5	97.82	157.52	4/5	97.82	60.74
37	97.29	156.67	37	97.29	60.41
1/5	96.77	155.83	1/5	96.77	60.09
2/5	96.25	155.00	2/5	96.25	59.77
3/5	95.74	154.17	3/5	95.74	59.45
4/5	95.23	153.34	4/5	95.23	59.13
38	94.73	152.55	38	94.73	58.82
1/5	94.24	151.75	1/5	94.24	58.52
2/5	93.75	150.96	2/5	93.75	58.22
3/5	93.26	150.17	3/5	93.26	57.91
4/5	92.78	149.40	4/5	92.78	57.61
39	92.30	148.64	39	92.30	57.32
1/5	91.83	147.87	1/5	91.83	57.02
2/5	91.37	147.13	2/5	91.37	56.74
3/5	90.91	146.39	3/5	90.91	56.45
4/5	90.45	145.65	4/5	90.45	56.17
40	90.00	144.92	40	90.00	55.89
1/5	89.55	144.20	1/5	89.55	55.61
2/5	89.11	143.49	2/5	89.11	55.33
3/5	88.67	142.78	3/5	88.67	55.06
4/5	88.23	142.07	4/5	88.23	54.79
41	87.80	141.39	41	87.80	54.52
1/5	87.38	140.70	1/5	87.38	54.26
2/5	86.95	140.01	2/5	86.95	53.99
3/5	86.53	139.34	3/5	86.53	53.73
4/5	86.12	138.68	4/5	86.12	53.48
42	85.71	138.02	42	85.71	53.22
1/5	85.30	137.35	1/5	85.30	52.97
2/5	84.90	136.71	2/5	84.90	52.72
3/5	84.50	136.07	3/5	84.50	52.47
4/5	84.11	135.44	4/5	84.11	52.23
43	83.72	134.81	43	83.72	51.99
1/5	83.33	134.18	1/5	83.33	51.75
2/5	82.95	133.57	2/5	82.95	51.51
3/5	82.57	132.96	3/5	82.57	51.27
4/5	82.19	132.35	4/5	82.19	51.04
44	81.81	131.75	44	81.81	50.80
1/5	81.44	131.14	1/5	81.44	50.57
2/5	81.08	130.56	2/5	81.08	50.35
3/5	80.71	129.96	3/5	80.71	50.12
4/5	80.35	129.38	4/5	80.35	49.89
45	80.00	128.82	45	80.00	49.68
1/5	79.64	128.24	1/5	79.64	49.45
2/5	79.29	127.68	2/5	79.29	49.24
3/5	78 94	127.11	3/5	78.94	49.02
4/5	78.60	126.57	4/5	78.60	48.81

(Continued on page 630

Index to Tables and Data appears on Pages 23 to 25.

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A Few Facts Concerning the Hilliard and Richards

AUTOMOBILE CLUTCH

April 18, 1906, the Hilliard and Richards clutch was placed on a large touring car, and after a series of grilling tests important changes were made, and to-day we are in the market with what is unquestionably the best automobile clutch made, and as briefly as possible we would like to call your attention to a few of the many points in which the Hilliard and Richards clutch excels.

1—*A Rack and Gear Movement,* realizing a compounding spring pressure 10 to 1.

2—*A Screw Movement,* securing a gradual friction, overcoming that sudden jerk so objectionable in clutches.

3—*The use of Disks lined with a friction material* that will stand any conceivable amount of abuse. This having been demonstrated by 5 years of very hard service. This material will not burn or deteriorate by the slipping of clutch when slowing up without changing gears.

4—*Dry Plates,* securing a release that is always perfect, requiring no breaking friction to cause slow down for shifting gears.

5—*Simplicity of Adjustment,* by loosening set screw and turning plate to the right one gets the perfect and parallel adjustment necessary for best friction results when clutch is engaged.

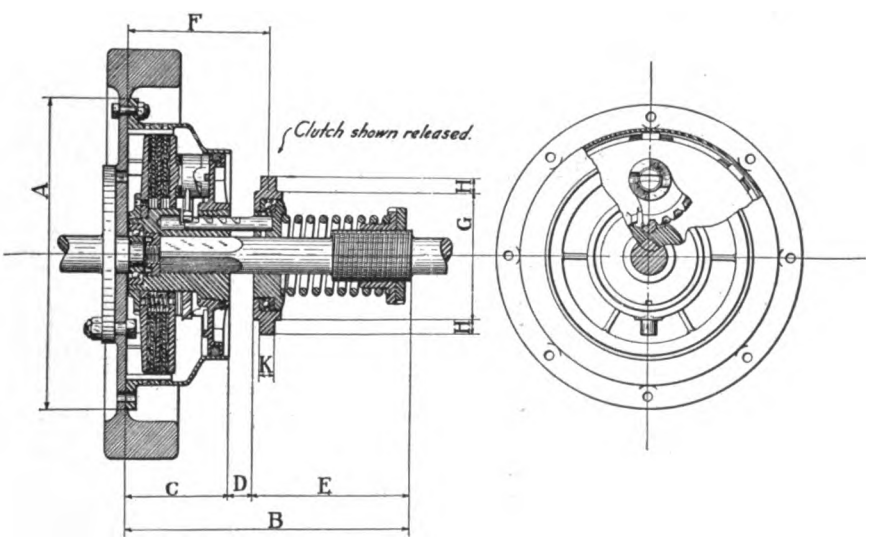
6—*A Ball-Bearing Thrust Collar* which does not cut or bind.

7—*An Annular Ball-Bearing* in which the tail shaft attached to fly wheel enters, eliminating the undesirable feature found in the non-ball-bearing makes.

Submit your Automobile Clutch troubles to our mechanical department

The Hilliard Clutch and Machinery Co.

104 W. Fourth Street **ELMIRA, N. Y.**



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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
46	78.26	126.02	46	78.26	48.60
1/5	77.92	125.47	1/5	77.92	48.39
2/5	77.58	124.92	2/5	77.58	48.17
3/5	77.25	124.39	3/5	77.25	47.97
4/5	76.92	123.86	4/5	76.92	47.76
47	76.59	123.34	47	76.59	47.56
1/5	76.27	122.81	1/5	76.27	47.36
2/5	75.95	122.30	2/5	75.95	47.16
3/5	75.63	121.78	3/5	75.63	46.96
4/5	75.31	121.27	4/5	75.31	46.76
48	75.00	120.77	48	75.00	46.57
1/5	74.68	120.25	1/5	74.68	46.37
2/5	74.38	119.77	2/5	74.38	46.19
3/5	74.07	119.27	3/5	74.07	46.00
4/5	73.77	118.79	4/5	73.77	45.81
49	73.47	118.30	49	73.47	45.62
1/5	73.17	117.82	1/5	73.17	45.44
2/5	72.87	117.34	2/5	72.87	45.25
3/5	72.58	116.87	3/5	72.58	45.07
4/5	72.29	116.40	4/5	72.29	44.89
50	72.00	115.94	50	72.00	44.71
1/5	71.71	115.47	1/5	71.71	44.53
2/5	71.42	115.00	2/5	71.42	44.35
3/5	71.14	114.55	3/5	71.14	44.18
4/5	70.86	114.10	4/5	70.86	44.00
51	70.58	113.67	51	70.58	43.83
1/5	70.31	113.22	1/5	70.31	43.66
2/5	70.04	112.78	2/5	70.04	43.49
3/5	69.76	112.33	3/5	69.76	43.32
4/5	69.49	111.90	4/5	69.49	43.15
52	69.23	111.48	52	69.23	42.99
1/5	68.96	111.04	1/5	68.96	42.82
2/5	68.70	110.62	2/5	68.70	42.66
3/5	68.44	110.21	3/5	68.44	42.50
4/5	68.18	109.79	4/5	68.18	42.34

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
53	67.92	109.38	53	67.92	42.18
1/5	67.66	108.95	1/5	67.66	42.01
2/5	67.41	108.55	2/5	67.41	41.86
3/5	67.16	108.14	3/5	67.16	41.70
4/5	66.91	107.74	4/5	66.91	41.55
54	66.66	107.34	54	66.66	41.39
1/5	66.42	106.95	1/5	66.42	41.24
2/5	66.17	106.55	2/5	66.17	41.09
3/5	65.93	106.16	3/5	65.93	40.94
4/5	65.69	105.78	4/5	65.69	40.79
55	65.45	105.40	55	65.45	40.64
1/5	65.21	105.00	1/5	65.21	40.49
2/5	64.98	104.63	2/5	64.98	40.35
3/5	64.74	104.25	3/5	64.74	40.20
4/5	64.51	103.88	4/5	64.51	40.06
56	64.28	103.52	56	64.28	39.92
1/5	64.05	103.14	1/5	64.05	39.77
2/5	63.83	102.78	2/5	63.83	39.64
3/5	63.60	102.41	3/5	63.60	39.49
4/5	63.38	102.06	4/5	63.38	39.36
57	63.16	101.70	57	63.16	39.22
1/5	62.93	101.33	1/5	62.93	39.08
2/5	62.71	100.98	2/5	62.71	38.94
3/5	62.50	100.64	3/5	62.50	38.81
4/5	62.28	100.29	4/5	62.28	38.67
58	62.07	99.95	58	62.07	38.54
1/5	61.85	99.59	1/5	61.85	38.41
2/5	61.64	99.25	2/5	61.64	38.28
3/5	61.43	98.92	3/5	61.43	38.15
4/5	61.22	98.58	4/5	61.22	38.01
59	61.01	98.24	59	61.01	37.88
1/5	60.81	97.92	1/5	60.81	37.76
2/5	60.60	97.58	2/5	60.60	37.63
3/5	60.40	97.26	3/5	60.40	37.51
4/5	60.20	96.94	4/5	60.20	37.38

REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 1 MINUTE TO 30 MINUTES

Time for One Mile m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 0	60 00	96.61	1 0	60.00	37.26
1 1	59.00	95.00	1 1	59.00	36.64
1 2	58.06	93.49	1 2	58.06	36.05
1 3	57.14	92.01	1 3	57.14	35.48
1 4	56.25	90.58	1 4	56.25	34.93
1 5	55.38	89.17	1 5	55 38	34.39
1 6	54.54	87.82	1 6	54.54	33.87
1 7	53.73	86.52	1 7	53.73	33.36
1 8	52.94	85.25	1 8	52.94	32.87
1 9	52.17	84.01	1 9	52.17	32.40
1 10	51.42	82.80	1 10	51.42	31.93
1 11	50.70	81.64	1 11	50.70	31.48
1 12	50.00	80.51	1 12	50.00	31.05
1 13	49.31	79.40	1 13	49.31	30.62
1 14	48.65	78.34	1 14	48.65	30.21
1 15	48.00	77.29	1 15	48.00	29.81
1 16	47.37	76.28	1 16	47.37	29.41

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 17	46.75	75.28	1 17	46.75	29.05
1 18	46.15	74.31	1 18	46.15	28.66
1 19	45.57	73.38	1 19	45.57	28.30
1 20	45.00	72.46	1 20	45.00	27.94
1 21	44.44	71.56	1 21	44.44	27.60
1 22	43.90	70.69	1 22	43.90	27.26
1 23	43.37	69.84	1 23	43.37	26.93
1 24	42.85	69.00	1 24	42.85	26.61
1 25	42.35	68.19	1 25	42.35	26.30
1 26	41.86	67.40	1 26	41.86	26.00
1 27	41.38	66.63	1 27	41.38	25.7
1 28	40.91	65.87	1 28	40.91	25.40
1 29	40.45	65.13	1 29	40.45	25.10
1 30	40.00	64.41	1 30	40.00	24.84
1 31	39.56	63.70	1 31	39.56	24.56
1 32	39.13	63.01	1 32	39.13	24.30
1 33	38.71	62.33	1 33	38.71	24.04

(Continued on page 632)

Index to Tables and Data appears on Pages 23 to 25.

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AUTOMOBILE SUPPLIES

THE
WASHINGTON SPARK PLUG

Guaranteed for One Year

It is without any doubt that there is no plug on the Market Superior to the Washington.

Write us for general information.

USE ***Washington Dry Batteries***
Washington Friction Tape
Washington Welding Machines

We carry the largest and most complete stock of Automobile Supplies in the Middle West.

Write for large 1911 Catalogue. We sell to Dealers Only.

Washington Automobile Supply Co.
Manufacturers and Jobbers
WASHINGTON, ILLINOIS

SPARK MAC-KAE PLUGS

THE **MOST** Maximum Power
OF
THE **BEST** Positive Ignition
FOR
THE **LEAST** Minimum Fuel Consumption

Equip your car NOW and save money

All threads regulation length or extension.
Porcelain or mica cores.
PRICE, $1.00 each.

MAC-KAE MFG. CO.
185 Amory St., Jamaica Plain
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The
"Monroe" Multi-Spark

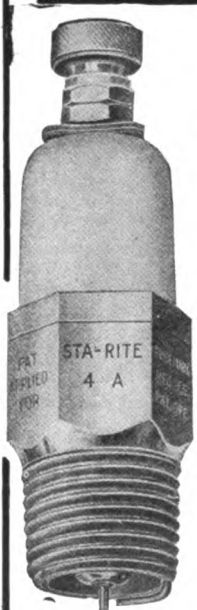
A Plug that is Gas Tight.

Will Not Soot Up and Miss Fire.

Guaranteed for One Year.

The Monroe Elect. Mfg. Co.
Box 57
Monroe, Mich.

STA-RITE
"STAYS RIGHT THE LONGEST"



They can't go wrong, because of their construction; if they did, we couldn't guarantee them as we do.

Dealers find an easy market for plugs that are guaranteed perpetually. We aim to help the dealer sell plugs by giving him the best plug possible and at a reasonable price, also by standing behind the plugs to the limit.

We have other attractive features, such as a free lined carrying case given to customers buying 6 plugs. Write at once for particulars.

The R. E. Hardy Co.
Austin Ave. and MaySt.
CHICAGO, ILL.

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre. m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 34	38.29	61.66	1 34	38.29	23.77	3 6	19.35	31.16	3 6	19.35	12.01
1 35	37.89	61.01	1 35	37.89	23.53	3 12	18.75	30.19	3 12	18.75	11.64
1 36	37.50	60.38	1 36	37.50	23.28	3 18	18.18	29.27	3 18	18.18	11.29
1 37	37.11	59.76	1 37	37.11	23.04	3 24	17.64	28.40	3 24	17.64	10.95
1 38	36.73	59.14	1 38	36.73	22.81	3 30	17.14	27.60	3 30	17.14	10.64
1 39	36.36	58.55	1 39	36.36	22.58	3 36	16.66	26.82	3 36	16.66	10.34
1 40	36.00	57.97	1 40	36.00	22.35	3 42	16.21	26.10	3 42	16.21	10.06
1 41	35.64	57.39	1 41	35.64	22.13	3 48	15.79	25.42	3 48	15.79	9.80
1 42	35.29	56.82	1 42	35.29	21.91	3 54	15.38	24.76	3 54	15.38	9.55
1 43	34.95	56.28	1 43	34.95	21.70	4 0	15.00	24.15	4 0	15.00	9.31
1 44	34.61	55.73	1 44	34.61	21.50	4 6	14.63	23.56	4 6	14.63	9.08
1 45	34.28	55.20	1 45	34.28	21.28	4 12	14.28	22.99	4 12	14.28	8.86
1 46	33.96	54.68	1 46	33.96	21.09	4 18	13.95	22.46	4 18	13.95	8.66
1 47	33.64	54.17	1 47	33.64	20.89	4 24	13.63	21.95	4 24	13.63	8.46
1 48	33.33	53.67	1 48	33.33	20.70	4 30	13.33	21.46	4 30	13.33	8.28
1 49	33.03	53.19	1 49	33.03	20.51	4 36	13.04	21.00	4 36	13.04	8.10
1 50	32.72	52.69	1 50	32.72	20.32	4 42	12.76	20.54	4 42	12.76	7.92
1 51	32.43	52.22	1 51	32.43	20.14	4 48	12.50	20.13	4 48	12.50	7.76
1 52	32.14	51.75	1 52	32.14	19.96	4 54	12.24	19.71	4 54	12.24	7.60
1 53	31.86	51.30	1 53	31.86	19.78	5 0	12.00	19.32	5 0	12.00	7.45
1 54	31.58	50.85	1 54	31.58	19.61	5 12	11.54	18.58	5 12	11.54	7.16
1 55	31.30	50.40	1 55	31.30	19.43	5 24	11.11	17.89	5 24	11.11	6.90
1 56	31.03	49.96	1 56	31.03	19.27	5 36	10.71	17.24	5 36	10.71	6.65
1 57	30.77	49.55	1 57	30.77	19.11	5 48	10.34	16.65	5 48	10.34	6.42
1 58	30 50	49.11	1 58	30.50	18.94	6 0	10.00	16.10	6 0	10.00	6.21
1 59	30.25	48.71	1 59	30.25	18.78	6 15	9.60	15.46	6 15	9.60	5.96
2 0	30.00	48.30	2 0	30.00	18.63	6 30	9.23	14.86	6 30	9.23	5.73
2 3	29.26	47.11	2 3	29.26	18.17	6 45	8.88	14.30	6 45	8.88	5.51
2 6	28.57	46.00	2 6	28.57	17.74	7 0	8.57	13.80	7 0	8.57	5.32
2 9	27.90	44.92	2 9	27.90	17.32	7 15	8.27	13.31	7 15	8.27	5.13
2 12	27.27	43.91	2 12	27.27	16.93	7 30	8.00	12.88	7 30	8.00	4.97
2 15	26.66	42.93	2 15	26.66	16.55	7 45	7.74	12.46	7 45	7.74	4.80
2 18	26.08	42.00	2 18	26.08	16.20	8 0	7.50	12.08	8 0	7.50	4.66
2 21	25.53	41.11	2 21	25.53	15.85	8 30	7.06	11.37	8 30	7.06	4.38
2 24	25.00	40.25	2 24	25.00	15.52	9 0	6.66	10.72	9 0	6.66	4.13
2 27	24.49	39.43	2 27	24.49	15.21	9 30	6.31	10.16	9 30	6.31	3.92
2 30	24.00	38.64	2 30	24.00	14.90	10 0	6.00	9.66	10 0	6.00	3.72
2 33	23.53	37.89	2 33	23.53	14.61	10 30	5.71	9.19	10 30	5.71	3.54
2 36	23.07	37.15	2 36	23.07	14.32	11 0	5.45	8.77	11 0	5.45	3.38
2 39	22.64	36.45	2 39	22.64	14.06	11 30	5.21	8.39	11 30	5.21	3.23
2 42	22.22	35.78	2 42	22.22	13.80	12 0	5.00	8.05	12 0	5.00	3.10
2 45	21.81	35.12	2 45	21.81	13.54	13 0	4.61	7.42	13 0	4.61	2.86
2 48	21.42	34.49	2 48	21.42	13.31	14 0	4.28	6.89	14 0	4.28	2.66
2 51	21.05	33.89	2 51	21.05	13.07	15 0	4.00	6.44	15 0	4.00	2.48
2 54	20.69	33.31	2 54	20.69	12.85	20 0	3.00	4.83	20 0	3.00	1.86
2 57	20.34	32.75	2 57	20.34	12.63	30 0	2.00	3.22	30 0	2.00	1.24
3 0	20.00	32.20	3 0	20.00	12.42						

SPEED IN MILES PER HOUR WITH DIFFERENT GEAR RATIOS AND ROAD WHEEL SIZES AT 1000 R. P. M. OF ENGINE (WITH 3 PER CENT. LOSS ALLOWANCE)

GEARS	4:1	3½:1	3:1	2½:1	2:1	1:1
30-in. Wheel....	21.64	24.73	28.86	34.63	43.29	86.57
32 " "	23.09	26.38	30.78	36.94	46.17	92.34
33 " "	23.81	27.21	31.74	38.09	47.62	95.23
34 " "	24.53	28.03	32.70	39.25	49.06	98.12
36 " "	25.98	29.68	34.63	41.55	51.94	103.89
38 " "	27.41	31.33	36.55	43.86	54.83	109.66
40 " "	28.85	32.97	38.37	46.16	57.71	115.41

Index to Tables and Data appears on Pages 23 to 25.

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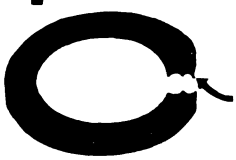
The "U. S." Corrugated Lock Washer is *Safest* for Automobiles



Patented

These sharp corrugations prevent the nut from ever loosening from vibration. Locks and stays locked. Will not injure thread. Send for descriptive Price List.

"U. S." Lock Washer Co., 34-36 Brenner Street NEWARK, N. J.

RELIANCE LOCK WASHERS

TYPE A

MADE IN ALL BOLT SIZES IN TYPES SHOWN AND FROM ANY SIZE OF SPECIAL HIGH CARBON STEEL

TYPE C

TYPE B

SEND FOR COMPLETE CATALOGUE OF SIZES AND LIST PRICES

THE RELIANCE MFG. CO.
MASSILLON, O.

TYPE D

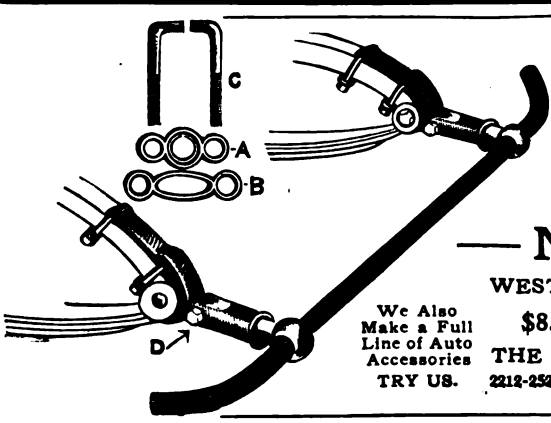
Positive

The POSITIVE Lock Washer

Plain

Made in all sizes and weights for Automobile purposes. Can be used thinner than any other lock washer — effective, no matter how thin. One lock under the nut and head can be used if so desired. Exhaustive tests, covering a period of nearly 12 years on railroad track, drop presses, Automobiles and machinery subject to vibration, have proven its superiority over every nut lock manufactured. *Write for samples and price.*

POSITIVE LOCK WASHER CO., Newark, N. J.



MOTHER OF INVENTION What Is?

— NECESSITY —

WESTERN ANCHOR BOLT-ON TYPE

$8.00 and $10.00 Auto Bumper

THE WESTERN BRASS MFG. WORKS
2212-2522 West 21st Street CHICAGO, ILL.

We Also Make a Full Line of Auto Accessories
TRY US.

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HILL-CLIMBING FORMULAS (WORBY BEAUMONT)

W = Weight of car and load in pounds.
w = Weight of car and load in tons.
H = Total ascent in feet.
L = Length of hill in feet.
R = Road resistance in pounds per ton weight of car and load.
r = Air resistance in pounds = $V^2 A\ 0.0017$.
V = Velocity of car in feet per second.
A = Area of car in square feet presented to air resistance.
T = Time occupied in ascent in seconds.
E = Efficiency of transmission of power from engine to road wheels.
$H.P.$ = Effective horse power of engine.
p = Power given off at road wheels or work done in ascending hill.
S = Speed of ascent in miles per hour.

Then if P = Mean effective cylinder pressure
L = Length of stroke in feet.
A = Area of piston in square inches.
N = Number of useful or firing strokes per minute,

the brake horse-power of petrol or steam engines, having a mechanical efficiency of E, is

$$\frac{EPLAN}{33000}$$

For compound steam engines the number of useful working strokes are those occurring in the low-pressure cylinder, and the mean effective pressure in the high-pressure cylinder or cylinders is referred to the area of the low-pressure cylinder.

The power given off at the road wheels during the ascent of the hill is

$$p = \frac{HW + (R\,w + r)\,L}{T\ 550}$$

and the brake horsepower required at the engine with a selected value of E is

$$HP = \frac{HW + (R\,w + r)\,L}{TE\ 550}$$

With the other conditions known, the efficiency may be found from

$$\eta = \frac{HW + (R\,w + r)\,L}{HP.\ T\ 550}$$

the speed of the ascent in miles per hour from

$$S = \frac{\dfrac{L}{HWL + (R\,w + r)}}{HP.\ E\ 550}\ L \times 1.466$$

and the time occupied in the ascent from

$$T = \frac{HW + (R\,w + r)\,L}{HP.\ E\ 550}$$

Unless the probable speed of the car is high, or the wind velocity such that the pressure upon the surface of the car presented to air resistance opposing motion approaches that due to the speed of the car through still air, then the quantity r may be omitted from the foregoing expressions without introducing more than slight error

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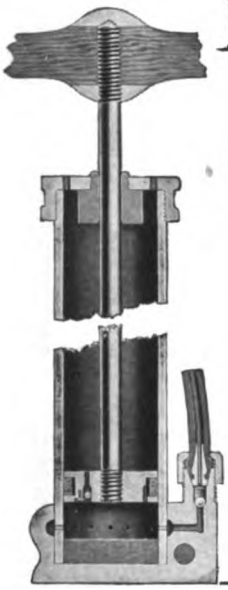
Pitner Pump



Only Tire Pump guaranteed for FIVE YEARS' SERVICE, $5

Note construction of handle, steel bearing around piston rod, solid heavy brass barrel and unique air tight piston. You never strike bottom with a Pitner Pump. Air cushion formed after piston passes outlet holes prevents it. Note the special Pitner hose connection. These are sold separately, price 35c. each. Write for booklet explaining all pumps. Sent free.

PITNER PUMP CO.
30 W. Michigan St.
CHICAGO

PATENTED March 19, 1907

The
NOERA Compound Auto Pump

Ready for Market

The best pump in workmanship, material and finish ever produced.

We are the LARGEST Pump Manufacturers of all Descriptions on EARTH.

WRITE FOR CIRCULARS, ETC.

The Noera Mfg. Co., Waterbury, Conn.

More Repair Dollars

ALWAYS plenty of tire repair jobs to do. Big money in it too for the wise repairman who is fitted to turn out clean, smooth work without delay. $15 to $20 per day is the ordinary profit of the live repairman who has a

SHALER VULCANIZER
Electric or Alcohol Heated

The Shaler is used by three-fourths or all the garages in the United States. Absolutely automatic—needs no attention after starting. Vulcanizes quickly—outer casings need not be removed from wheel. Makes a perfect weld—does not undercure—cannot burn. Has big capacity for work, pays for itself in a few days. Uses direct or alternating current—also made for use with alcohol. Costs but ½c. per hour to operate. **Sold under absolute guarantee.**

Send for Free Hand Book

Tells all about the Shaler and its money making possibilities for you. Free if you write today.

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Smaller outfits for individual auto owners. Send for booklet.

OUR NEW
WIND SHIELD
Number 57

Five different positions, same shield used as either straight or angle.
Strictly High Grade

Manufactured by
DOUGLAS & LOMASON CO.
DETROIT

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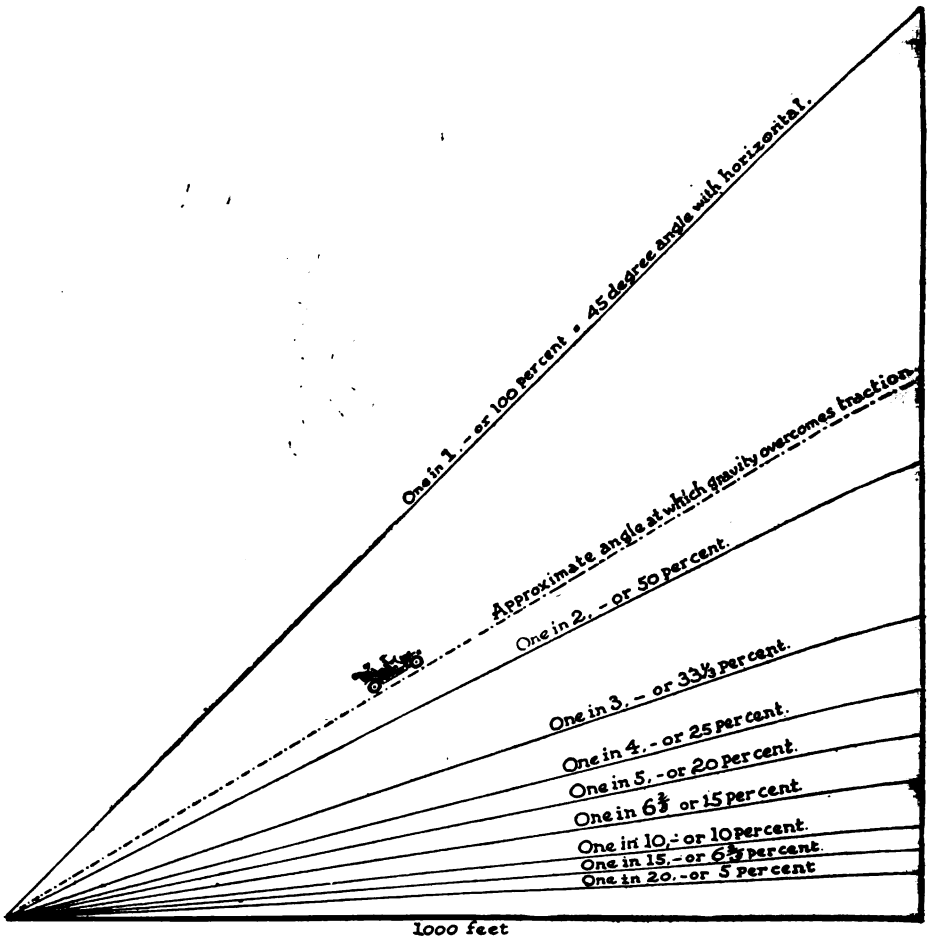
MEASUREMENT OF GRADES



ILLUSTRATING METHOD OF CALCULATING GRADE PERCENTAGES

If it be assumed that the base of the triangle represents a line 1,000 feet long and that the first sloping line represents a road having a rise that brings it 50 feet above the starting point, this is figured as 50 feet in a thousand, or 5 per cent. In other words, one foot of rise for every 20 feet, but the latter distance does not mean distance actually traveled by a car in ascending such a slope, but distance measured horizontally with reference to that slope. The grade is measured by the tangent of the angle of inclination and not by its sine, so that a grade which represents 100 per cent. corresponds to an angle of inclination of but 45 degrees, and not 90 degrees, or perpendicular, as is commonly supposed. At the upper end of the next sloping line the elevation would amount to 66⅔ feet, which is equivalent to a rise of 6⅔ feet for each 100 feet traveled horizontally. So one in three corresponds to a 33 1-3 per cent. grade, one in two to a 50 per cent. grade, and so on until a 100 per cent. grade is reached, which, as noted, is the equivalent of a 45 degree angle.

Index to Tables and Data appears on Pages 23 to 35.

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AUTOMOBILE SUPPLIES

Send for our 1911 Catalog, now ready for distribution. Large Stock—Lowest Prices

THE POST & LESTER CO.

HARTFORD, CONN.

America's Largest Dealers in Automobile Supplies

Branches in all the Principal Cities of New England

The Dealer Protected

We sell automobile supplies at wholesale only. We take care of the dealer—under no conditions do we sell to the consumer. We make attractive prices to the dealer and leave him with his field free to profits. We never sell in competition with the dealer.

Anything and everything in Supplies, Parts, Accessories, Tools and Shop and Garage Equipment. Our stocks are always full, our shipments prompt, our prices generally a little lower than elsewhere. Bring your wants to us.

The Automobile Supply Co.

1335 Michigan Ave. CHICAGO

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TABLE OF GRADIENTS

GRADE		Equal to Angle of	Rise or Fall in One Mile, Feet
Per Cent	Units		
20	1 in 5	11° 19′	1056
17	1 " 6	9° 26′	880
14	1 " 7	8° 09′	754
12.5	1 " 8	7° 08′	635
11	1 " 9	6° 17′	586
10	1 " 10	5° 43′	528
9	1 " 11	5° 11′	480
8	1 " 12	4° 46′	440
7.75	1 " 13	4° 24′	406
7	1 " 14	4° 05′	337
6.5	1 " 15	3° 49′	352
6.25	1 " 16	3° 35′	330
6	1 " 17	3° 22′	310
5.5	1 " 18	3° 11′	293
5	1 " 19	3° 00′	277
5	1 " 20	2° 52′	204
4	1 " 25	2° 18′	218
3.3	1 " 30	1° 55′	155
2.8	1 " 35	1° 38′	151
2.5	1 " 40	1° 26′	132

COMPOUND EQUIVALENTS

Atmosphere (14.7 lbs. per square inch) = 1.0335 kilogrammes per square centimetre.
1 Foot-pound = 0.1382 kilogrammetre.
1 lb. per square inch = 0.0703077 kilogramme per square centimetre = 0.7031 gramme per square millimetre = 5.170 centimetres of mercury at 0 degrees Centigrade.
1 Kilogramme per square millimetre = 1422.32 lbs. per square inch = 0.635 ton per square inch.
1 Kilogramme per square centimetre = 14.2232 lbs. per square inch.
1 Gramme per square millimetre = 1.422 lbs. per square inch.
1 Kilogrammetre = 7.233 foot-pounds.
1 Gramme per square centimetre = 0.01422 lb. per square inch.
1 Calorie or French unit of heat = 3.968 British Thermal Units.
French mechanical equivalent of heat (425 kilogrammetres) = 3,074 foot-pounds per unit.
1 Calorie per square metre = 0.369 heat-unit per square foot.
1 Calorie per kilogramme = 1.800 heat-units per lb.
English unit of heat, or heat-unit = 0.252 calorie.
English mechanical equivalent to one heat-unit (778 foot-pounds) = 10.67 kilogrammetres.
1 English heat-unit per square foot = 2.713 calories per square metre.
1 English heat-unit per lb. = 5.9 calorie per kilogramme.

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ARROW BRAND
ARROW NICKEL ALLOY STEEL

CASE-HARDENING DIP-HARDENING CYANIDING

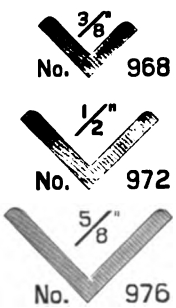
ONE OF THE ABOVE GRADES WILL MEET THE SPECIFICATIONS OF ANY PART OF YOUR CAR

DETERMINATIONS OF RELIABLE PHYSICAL TESTS DEMONSTRATE A COMBINATION OF HARDNESS AND TOUGHNESS PRODUCING A REMARKABLE ANTI-FATIGUE QUALITY

Furnished in billets, hot or cold-rolled bars and strips, hammer and drop forgings.
Detailed information upon request. Quotations upon receipt of specifications.
Samples free of charge for testing.

JOHN A. CROWLEY COMPANY

Sole American Selling Agents **120-122 Liberty Street, NEW YORK, N. Y**

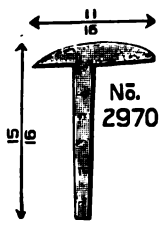


A complete stock of square root Angles and Channels carried in stock at all times in Chicago and New York.

We also carry a full line of **all steel hand power Punch & Shearing Machines.**

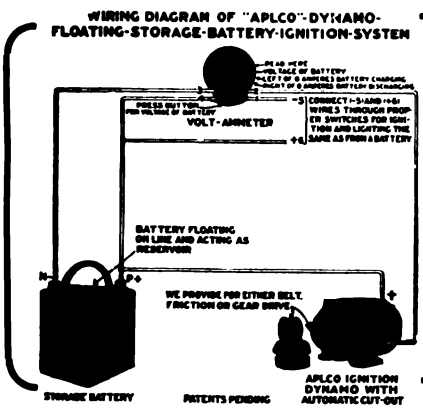
Complete Oxy-Acetylene Welding Outfits, Torches, and all other accessories always on hand.

Prices and large catalogue on application.



J. G. BRAUN **615-621 So. Paulina Street CHICAGO, ILL.**

537-541 West 35th Street, NEW YORK, N. Y.



The "Aplco" Dynamo-Floating Storage Battery Ignition and Lighting System for Automobile, Motor Boat and Stationary Engine.

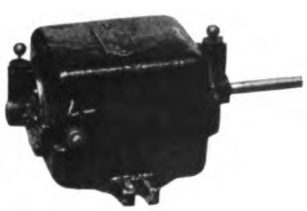
"Aplco" all Rubber-Lead Storage Batteries. "White Light" Tungsten Filament Lamps, all sizes.

Write for bulletins giving complete descriptions.

Apple Electric Company

14 North Canal Street **Dayton, Ohio, U. S. A.**

ELECTRIC LIGHTING OUTFITS



Consisting of Dynamo or Magneto Generator, Storage Battery, Switchboard with Cutout, Tail, Side and Head Lights, at lowest possible prices.

Send for full particulars.

THE AMERICAN MFG. COMPANY

MERIDEN, CONN.

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STORAGE BATTERY CHARGING AND DISCHARGING

The positive plate of a lead-storage battery during charge absorbs oxygen gas turning a brown color (Peroxide of Lead, TbO_2) during the process, while the negative is reduced by the hydrogen, changing to a dull gray or slate color—spongy lead.

During discharge the positive plate parts with some of its oxygen and being gradually reduced to a lower oxide of lead is attacked by the sulphuric acid, forming lead sulphate, $PbSO_4$, while the negative plate gives up some of its hydrogen and is also gradually attacked by the acid, forming lead sulphate too. Meanwhile the density of the electrolyte has become less, owing to the formation of water from the H_2O set free from the plates.

This formation of a film of sulphate on both plates brings them both to a state of balance, and the electromotive force of the battery will fall in proportion to the amount of sulphate abstracted from the acid until only water is left. In practice, the voltage should not be allowed to drop delow 1.7 volts, for the reason that the excessive sulphate is almost impossible to remove entirely, and as it is to a considerable extent an insulator it causes a lowering of the voltage of the cell. When discharged the plates will be found to have changed their color somewhat again, both becoming of a lighter shade.

On charging again, both plates give up their sulphate, which returns to the acid, increasing its density to its normal condition as before—the positive plate becoming lead peroxide and the negative, spongy lead, until the cell is fully charged. The sequence of operations might aptly be termed the battery cycle.

This may be better represented in the form of an equation, thus:

Positive Plates	Electrolyte	Negative Plates
	BATTERY FULLY CHARGED	
PbO_2	H_2SO_4 Sp. Gr. 1.275 (Strong)	Pb
	HALF DISCHARGED	
$PbO_2 + PbSO_4$	H_2SO_4 Sp. Gr. 1.240 (Medium)	$Pb + PbSO_4$
	FULLY DISCHARGED	
$PbSO_4$	H_2SO_4 Sp. Gr. 1.180 (Weak)	$PbSO_4$

Where PbO_2 represents the chemical symbol for lead peroxide or dioxide.
Where $PbSO_4$ represents the chemical symbol for lead sulphate.
Where H_2SO_4 represents the chemical symbol for sulphuric acid.

REVERSIBLE CHEMICAL EQUATIONS SHOWING CHANGES WHICH TAKE PLACE IN THE LEAD STORAGE BATTERY (LAMAR LYNDON)

CHARGE

$$\leftarrow$$

(a) $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$

(b) $Pb + H_2SO_4 = PbSO_4 + H_2$

(c) $c = (a) + (b) = PbO_2 + Pb + 2H_2SO_4 = 2PbSO_4 + 2H_2O$ (a)

$$\rightarrow$$

DISCHARGE

Equation (*a*) expresses the reactions at the positive plate; (*b*) those at the negative, and (*c*) the combined effect is the fundamental equation of the lead storage battery.

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ELECTROLYTE

ABSOLUTELY FREE FROM IMPURITIES, FOR STORAGE BATTERIES OF ALL KINDS

FRANKLIN H. KALBFLEISCH CO.

MANUFACTURING CHEMISTS

Broadway and Sixteenth Street
NEW YORK

THE TOLEDO BENDING CO.,

Toledo, Ohio,

Manufacturers of the celebrated "TOLEDO BRANDS" of

AUTOMOBILE BOWS, FELLOES and SPOKES.

Also makers of SPECIAL BENDINGS for automobile work.

THE DELPHOS HOOP CO.

DELPHOS, OHIO

Manufacturers of

High Grade Buggy and Automobile Bows,
and Small Dimension Stock

JOHN BOHNET & CO., Inc.

Manufacturers of

Auto Tops, Chain Boots, Lamp Covers
Auto Bodies Painted and Upholstered

Clark Building, Corner Grand Avenue and Washtenaw Street
LANSING, MICH.

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USEFUL ENGINEERING DATA

Water weighs 62.4 pounds per cubic foot, and 8.3 pounds per gallon.

There are 7.5 gallons in a cubic foot of water.

Gasoline has a specific gravity of .72, and consequently weighs 5.96 pounds per gallon. This applies to 76° gasoline.

A foot-pound represents the work required to raise a weight of one pound to a height of one foot. There are 33,000 foot-pounds to a horsepower.

A British Thermal Unit represents the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39° F. Its symbol is B. T. U.

There are 778 foot-pounds in a B. T. U.

There are 42.4 B. T. U. to a horsepower.

The thermal efficiency of a good internal combustion motor is from 30 to 35 per cent.

The mechanical efficiency of a good internal combustion motor should be between 85 and 90 per cent.

On direct drive, with an efficient transmission and differential, about 88 per cent. of the power furnished by the motor should be delivered at the rear wheels

Under the best conditions, about 75 per cent. of the indicated horsepower of the engine should be available for useful work.

If the work performed at the rear wheels is reduced to heat units, it will be found that about 23 per cent. of the energy represented by the heating value of the fuel is available as useful work.

The piston speed of a motor should not exceed 1,000 feet per minute.

The peripheral velocity of a cast iron flywheel should not exceed 5,000 feet per minute. Should it exceed this speed, there would be danger of the flywheel bursting from centrifugal force.

USEFUL FUNCTIONS OF π

$\pi = 3.14159265$	$\frac{\pi}{7} = 0.44879895$	$\pi^2 = 9.86960440$	$\sqrt{\pi} = 1.77245385$
$\frac{\pi}{2} = 1.57079633$	$\frac{\pi}{16} = 0.19634954$	$\pi^3 = 31.00627668$	$\sqrt[3]{\pi} = 1.46459189$
$\frac{\pi}{3} = 1.04719755$	$\frac{\pi}{24} = 0.13089969$	$\frac{1}{\pi} = 0.31830989$	$\frac{1}{\sqrt{\pi}} = 0.56418958$
$\frac{\pi}{4} = 0.78539816$	$\frac{\pi}{32} = 0.09817477$	$\frac{1}{\pi^2} = 0.10132118$	$\frac{1}{\sqrt[3]{\pi}} = 0.68278406$
$\frac{\pi}{6} = 0.52359878$	$\frac{\pi}{180} = 0.01754329$	$\frac{1}{\pi^3} = 0.03225153$	$\text{Log } \pi = 0.49714987$

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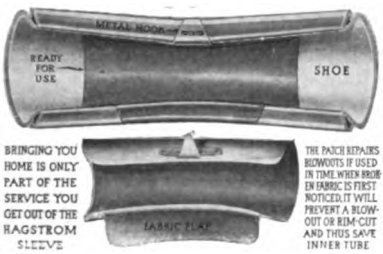
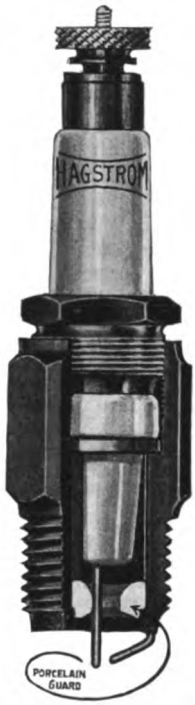
HAGSTROM

BLOWOUT PATCH



SPARK PLUG is in a class by itself. The porcelain guard makes the difference. Mr. Manufacturer, the efficiency of the Hagstrom plug compares favorably with your car. Better investigate now. Samples for testing purposes furnished upon request.



Solves the spare tire problem. Better include the **Hagstrom Blowout Patch** in your 1911 equipment. You know that the tire question is really the bugbear in the sales of the car. One well known manufacturer is already including two Hagstrom patches in the equipment of every car manufactured.

Hagstrom Quality Predominates

HAGSTROM BROS. MFG. CO. (Inc.)

Works: Lindsborg, Kansas

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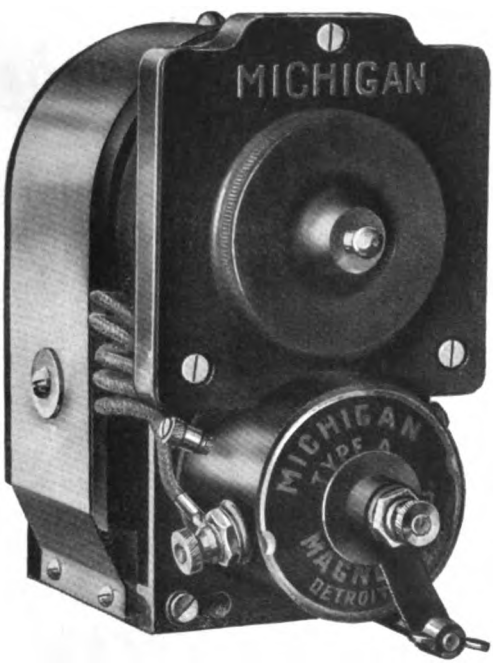

Michigan

This magneto will allow you to crawl along a crowded city street on high gear, without danger of stalling your motor for lack of spark—

or

when you reach a quiet country road, will give you the limit of your motor's power, if you care to speed.

MICHIGAN MAGNETO COMPANY, 117-119 Bagley Avenue, DETROIT, MICH.

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HEAT LOSSES DUE TO INCOMPLETE COMBUSTION IN GASOLINE MOTORS

Assuming that it were possible to secure complete combustion of the fuel, the result would be,

Carbon dioxide (CO_2) and water (H_2O).

With incomplete combustion the carbon is usually burned to carbon monoxide (CO) only, with consequent serious heat loss as the following table shows:

PRODUCTS OF COMBUSTION, FULL AND PARTIALLY LOADED

	Full Load	Partial Load	Slow Free
Carbon monoxide	3.13	6.9	——
Hydrogen	1.19	2.4	——
Hydrocarbons	0.30	0.9	——
Carbon dioxide	11.90	9.9	6.3
Oxygen	.23	0.3	11.2
Nitrogen	83.33	79.6	82.5
Total	100.0	100.0	100.0

Fuel value of carbon burned to carbon monoxide ..... =4,400 B.T.U.
Fuel value of carbon burned to carbon dioxide ..... =14,500 B.T.U.
Fuel value of hydrogen gas to water ..... =62,032 B.T.U.
Fuel value of hydrocarbon fuels to carbon dioxide ..... =20,000 B.T.U.

If we assume that the total as above given is 100 pounds and taking the fuel values as above set down for the respective elements and compounds, it will be possible to show that the loss will be enormous if the combustion is incomplete, as, for illustration, 6.9 pounds of carbon monoxide (shown at the top of the column for partial load) would mean a loss of 62,790 British thermal units of heat (B.T.U.). What is more to the point, the 2.4 pounds of hydrogen would mean a loss of 148,877 B.T.U. In the same way, all the losses may be determined.

COMBUSTION CONSTANTS OF VARIOUS GASES AND FUELS

	Atomic Weight Hydrogen=1	Molecular Weight H_2 = 2	Specific Gravity at 32° F. and Atmospheric Pressure Water=1	Density in Pounds per Cubic Foot	Specific Heat at Constant Pressure	Specific Heat at Constant Volume	Coefficient of Expansion of Volume at Constant Pressure per Deg. Centigrade	Coefficient of Expansion of Volume at Constant Pressure per Deg. Fahrenheit	British Thermal Units Given Out During Combustion with Oxygen
Air	.....	.....	.00130	.0809	.2377	.1690	.003665	.002036	.....
Carbon	11.97	.....	2.33	.....	.2411	.....	.....	.....	14,540
Carbonic acid gas	.....	CO^2 43.89	.00198	.1225	.2164	.1535	.003688	.002049	.....
Carbonic oxide	.....	CO 27.93	.00126	.0784	.2479	.1758	.003667	.002037	4,370
Coal gas (average)	.....	.....	.00054	.0335	.....	.....	.....	.....	17,800
Hydrogen	1	H_2 – 2	.00009	.0056	3.4046	2.414	.003667	.002037	61,260
Methane	.....	CH_4 15.97	.00072	.0448	.5929	.4701	.....	.....	26,400
Oxygen	15.96	O_2 31.92	.00144	.0896	.2182	.156	.....	.....	.....
Steam at 212° F.	.....	H_2O 17.96	.0008	.05	.4750	.34	.....	.....	.....
Refined petroleum	.....	.....	.8	.....	.....	.....	.....	.....	22,000
Crude petroleum	.....	.....	.9	.....	.....	.....	.....	.....	20,000

* Specific heat of gas engine exhaust gases = .258 at constant pressure and .189 at constant volume.

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In writing, name your car model

This model, with special flanges, will fit without any changes, Ford, Hupmobile, Buick 10, Overland 38, Maxwell (1-inch), Elmore and Cameron cars. Our Model H fits other and larger motors. The Marvel's heat jacket, UNDER AUTOMATIC CONTROL, makes it the greatest all-the-year-'round carbureter on the market for handling the so-called gasoline of to-day—great flexibility, economy and reliability.

The Marvel Carbureter Co.

2227 Alvord Street **Indianapolis, Indiana**

G R I S C O

THE REAL SELF STARTER

GRISCO is a simple ignition starting device which may be attached to any gasoline engine in a few hours. HOW IT WORKS—

By means of a small compressor, handy to your seat, you inject into the next two firing cylinders a mixture of gasoline and air as a highly explosive vapor; turn on the switch and your engine starts.

If your agent hasn't a GRISCO on hand, write us to ship you one direct. It is the natural logical way to start a motor, and is just as positive at zero as it is at 90 degrees in the shade.

IGNITION STARTER COMPANY

GRAND RAPIDS :: .: :: MICHIGAN

Mayer Carburetor for 1911

Notice the four essential features on the Mayer 1911, not found on other carburetors.

1. **Starting Valve** to start your car in cold weather.
2. **Hot Water Jacket** to vaporize gasoline in cold weather.
3. **Dash Pot Auxiliary Air Control** to make your car accelerate and run smoothly.
4. Provision for Attaching **Hot Air Tube** leading to exhaust manifold.

Send for Catalog.

MAYER CARBURETOR COMPANY

2673 MAIN STREET, BUFFALO, N. Y.

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COMPARATIVE TABLE OF FUEL COSTS FOR DIFFERENT MOTIVE POWERS

(Published by Farm Implement News)

Kind of Motive Power.	Rate of Fuel Consumed.	COST OF FUEL PER BRAKE TEST HORSE POWER																			
		For 1 Hour					For 24 Hours					For 300 Days of 10 Hours					For 300 Days of 24 Hours				
Gas Engine on Producer Gas.	In lbs. per h.p. per hour.	Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at				
		$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	.8	$c.12	$c.16	$c.20	$c.24	$c.28	c 2.9	c 3.9	c 4.8	c 5.76	c 6.72	$3.60	$4.80	$6.00	$7.21	$8.40	$8.64	$11.52	$14.40	$17.29	$20.16
	1.00	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.20	8.40	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.61	25.20
	1.25	.19	.25	.31	.38	.44	4.5	6.0	7.5	9.00	10.50	5.63	7.50	9.37	11.24	13.12	13.50	18.00	22.50	27.00	31.50
	1.50	.23	.30	.38	.45	.53	5.4	7.2	9.0	10.80	12.60	6.75	9.00	11.25	13.50	15.75	16.20	21.60	27.00	32.41	37.80
Gas Engine on Natural Gas.	In cu.ft. per h.p. per hour.	Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at				
		15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.
	9	c .14	c .18	c .23	c .27	c .32	c 3.2	c 4.3	c 5.4	c 6.5	c 7.6	$4.05	$5.40	$6.75	$8.10	$9.45	$9.72	$12.96	$15.20	$19.44	$23.68
	10	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.2	8.4	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.60	25.20
	11	.17	.22	.28	.33	.39	4.0	5.3	6.6	7.9	9.2	4.95	6.60	8.25	9.90	11.55	11.88	15.84	19.80	23.76	27.72
	12	.18	.24	.30	.36	.42	4.3	5.8	7.2	8.6	10.0	5.40	7.20	9.00	10.80	12.60	12.96	17.28	21.60	25.92	30.24
Gas Engine on Artificial (Illuminating) Gas.	In cu.ft. per h.p. per hour.	Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at				
		60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00
	15	c .90	c 1.05	c 1.20	c 1.35	c 1.50	c 21.6	c 25.2	c 28.8	c 32.4	c 36.0	$27.00	$31.50	$36.00	$40.50	$45.00	$64.80	$75.60	$86.40	$97.20	$108.00
	17	1.02	1.39	1.36	1.53	1.70	24.5	28.6	32.6	36.7	40.8	30.60	35.70	40.80	45.90	51.00	73.50	85.68	97.80	110.10	122.40
	20	1.20	1.40	1.60	1.80	2.00	28.8	32.8	38.4	43.2	48.0	36.00	42.00	48.00	54.00	60.00	86.40	98.00	115.20	129.60	140.00
Gasoline Engine.	In pints per h.p. per hour.	Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at				
		10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.
	.80	c 1.00	c 1.20	c 1.40	c 1.60	c 1.80	c 24.0	c 28.8	c 33.6	c 38.4	c 43.2	$30.00	$36.00	$42.00	$48.00	$54.00	$72.00	$80.40	$97.80	$115.20	$129.60
	1.00	1.25	1.50	1.75	2.00	2.25	30.0	36.0	42.0	48.0	54.0	37.50	45.00	52.50	60.00	67.50	90.00	108.00	126.00	144.00	162.00
	1.10	1.37	1.65	1.92	2.20	2.47	33.0	39.6	46.2	52.8	59.4	41.25	49.50	57.75	66.00	74.25	99.00	118.80	138.60	158.40	178.20
Electric Motor (85% efficiency of wiring) 746 w=h.p.	In K. W. per h.p. per hour.	Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at				
		2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.
	.878	c 1.75	c 2.63	c 3.51	c 4.39	c 6.14	c 42	c 63	c 84	$1.06	$1.48	$52.68	$79.02	105.36	131.70	184.38	126.60	189.90	253.20	316.50	443.10
Steam Engine on Coal.	In lbs. per h.p. per hour.	Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb Ton at				
		$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	4	c .60	c .80	c 1.00	c 1.20	c 1.40	c 14.4	c 19.2	c 24.0	c 28.8	c 33.6	$18.00	$24.00	$30.00	$36.00	$42.00	$43.20	$57.60	$72.00	$86.40	$100.80
	6	.90	1.20	1.50	1.80	2.10	21.6	28.8	36.0	43.2	50.4	27.00	36.00	45.00	54.00	63.00	64.80	86.40	108.00	129.60	151.20
	8	1.20	1.60	2.00	2.40	2.80	28.8	38.4	48.0	57.6	67.2	36.00	48.00	60.00	72.00	84.00	86.40	115.20	144.00	172.80	201.60
	10	1.50	2.00	2.50	3.00	3.50	36.0	48.0	60.0	72.0	84.0	45.00	60.00	75.00	90.00	105.00	108.00	144.00	180.00	216.00	252.00

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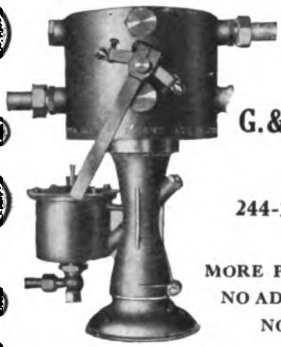
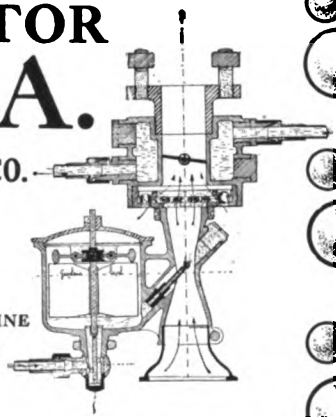
CARBURETTOR

G. & A.





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NO SPRINGS

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BALL CAGE: Automatically controlling the openings of auxiliary air for high and low speeds. **Write for Booklet on Carburetion.**

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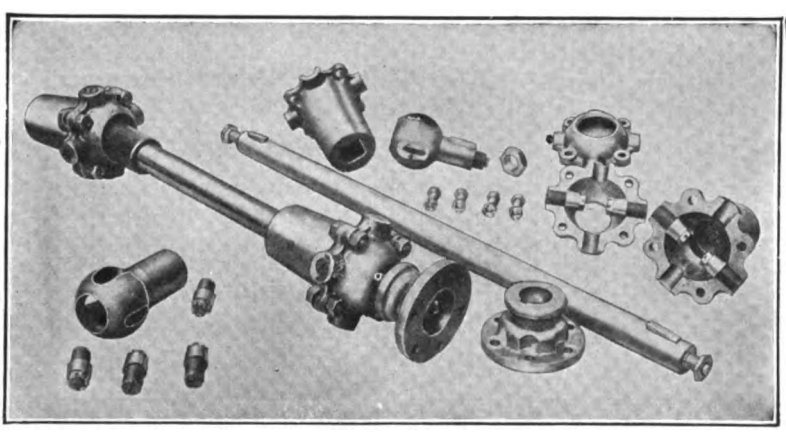

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A FEW FEATURES.

A round ball, dropped forged (hollow to hold compounded mica, for lubricant, for one year); has a stem bored out to admit a round tapered shaft with Woodworth key and a nut on inside of ball on shaft. The ball has four peculiar radii of cone grooves, something like the figure eight, to admit four tool steel pins. The pins and rollers, case hardened, against the hardened cone grooves in the ball, afford long life. The two semi-spherical shells which form the exterior housing are milled out to receive the center member, and the ends of the four radially arranged pins which the cone rolls on are held in position by clamping the two portions of the housing. The pins have shoulder threads where the housings clamp together, with lock nuts, making it adjustable. One end of the housing is arranged for the slip-sleeve. Patents are pending and infringers will be prosecuted. Write us for full information and prices.

ERIE AUTO PARTS CO., 719 ST. CLAIR AVE., N. E., CLEVELAND, O.

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PROPORTIONS OF ATMOSPHERIC AIR

(1) To find the quantity of nitrogen by volume corresponding to one volume of oxygen, multiply by 3.77092.

(2) To find the quantity of oxygen by volume corresponding to one volume of nitrogen, multiply by 0.265182.

(3) To find the quantity of nitrogen by weight corresponding to one part by weight of oxygen, multiply by 3.313022.

(4) To find the quantity of oxygen by weight corresponding to one part by weight of nitrogen, multiply by 0.301839.

(5) To find the quantity of nitrogen by volume corresponding to one part by weight of oxygen, multiply by 2.6365411.

(6) To find the quantity of oxygen by volume corresponding to one part by weight of nitrogen, multiply by 0.2730071.

(7) To find the quantity of nitrogen by weight corresponding to one part by volume of oxygen, multiply by 3.6629154.

(8) To find the quantity of oxygen by weight corresponding to one part by volume of nitrogen, multiply by 0.3792848.

Formula for correcting the volume of gases for temperature and pressure:

$$\frac{V}{V^1} = \frac{(273+t)P^1}{273+t^1P}.$$

When,

V = original volume;
V^1 = corrected volume;
t = original temperature in degrees Centigrade;
t^1 = final temperature in degrees Centigrade;
P = original pressure;
P^1 = final pressure;
273 = absolute temperature in degrees Centigrade.

Absolute temperature, if measured in Fahrenheit units, instead of in Centigrade as above given, would be 491.13 below the melting point of ice. The volume of a perfect gas increases 1/273 of its volume at 0 degrees Centigrade for every increase of 1 degree on the same scale. According to this, absolute zero corresponds to the temperature at which the same perfect gas would reduce to nothing.

RELATION OF GASOLINE VAPOR TO AIR

In any discussion of the relation of gasoline to atmospheric air, it becomes necessary to carefully distinguish as between vaporized and liquid gasoline. With air at 60 degrees Fahrenheit, about 15 per cent. of true gasoline vapor will produce a state of saturation. Such a mixture would be non-explosive, and in practice the following holds:

Volumes of Gasoline Vapor in Per Cent. of Air Volumes	*Volumes of Atmospheric Air at 60° F. Corresponding	
15.0	.....	Saturation point of air at 60° F.
5.5	3,400	Too rich to serve for the purpose.
4.0	4,000	Uncertain in its action.
....	5,000	.....
....	6,000	.....
....	7,000	.....
2.4	8,000	Suitable for the best results.
....	9,000	.....
1.9	10,000	Too uncertain to be of value.

* In the above table the volumes of air relate to one volume of liquid gasoline, whereas the vapor volumes are in percentage of the air volumes used in each case. Absolutely accurate determinations will depend upon the mixture being of a definite character.

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(PATENT PENDING)

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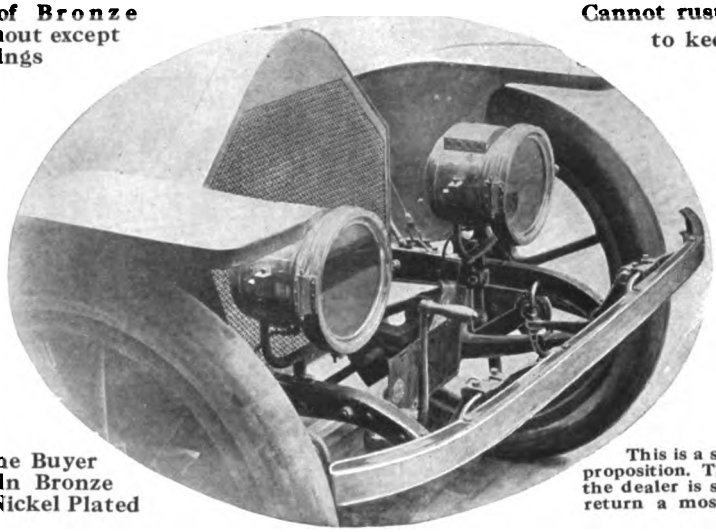
Cannot rust. Easy to keep clean



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$20.00 in Bronze
$22.50 Nickel Plated

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NEWARK, N. J.

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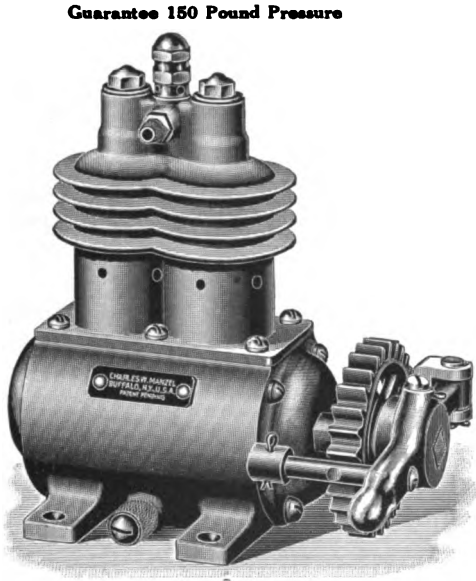
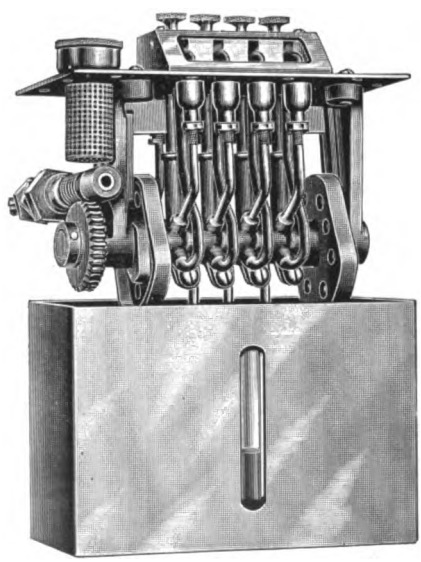
Guarantee 150 Pound Pressure



½ Actual Size, Weight 5 lbs. 1⅜ Bore, 1½ Stroke, Ground Pistons and Piston Rings, Sliding Gear, Drive and Positive Clutch for End Drive.

Positive Valveless Lubricator

Accessible Simplicity



Made in all sizes, one to twenty feeds. Drive at any position on tanks.

Write for Circular and Prices.

CHARLES W. MANZEL - - 89-93 Main St., Buffalo, N. Y.

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PROPERTIES OF GASOLINE AND DENATURED ALCOHOL (MUNTZ)

Properties	Gasoline	Denatured Alcohol
Carbon	84.3 per cent.	41.5 per cent.
Hydrogen	15.7 per cent.	13.0 per cent.
Oxygen	.....	45.5 per cent.
Density at 15° C.	.708	.834
Boiling point	88° C.	78.5° C.
Calories per Kg	*11,359.65	‡6,521.75
Weight evaporated per hour per dm.² (15.5 sq. in.) of surface:		
1. In experiment room; 18° C.	9.37 g. (0.33 oz.)	3.47 g. (0.12 oz.)
2. Outside in the sun; 25° C.	47.21 g. (1.66 oz.)	27.08 g. (0.95 oz.)

* 1,302 British heat units per lb. ‡ 752 British heat units per lb.

TESTS WITH BRITISH MOTOR FUEL

GASOLINE AND BENZOL TESTS

Six-Cylinder Napier Engine

	Specific Gravity	Temperature of Testing Room, Fahr.	Average of Three Tests, B.H.P.	Remarks
Ordinary gasoline	.687	67.1	64.25	
" "	.699	69.8	64.4	
" "	.713	65.3	64.4	
" "	.714	60.8	65.5	
" "	.759	67.1	63.5	
Benzol	.873	75.2	64.1	Exhaust has a sulphurous, pungent smell. Engine started quite easily.

PROPERTIES OF GASES

(1*)	(2*)	(3*)	(4*)	(5*)
Hydrogen	H	.0692	.00559	52230
Oxygen	O	1.106	.08921	.....
Nitrogen	N	.971	.07831	.....
Carbon Monoxide	CO	.967	.07807	4380
Carbon Dioxide	CO_2	1.529	.12267	.....
Dry Air	.....	1.000	.08072	....
Water Vapor	H_2O	.625	.05020	.....
Acetylene	C_2H_2	.915	.07251	20673
Methane	CH_4	.554	.04464	21385
Ethylene	C_2H_2	.974	.07805	20025
Alcohol	C_2H_6O	1.601	.12598	12000

*1 Gases.
*2 Chemical Formula or Symbol.
*3 Density (Air = 1).
*4 Weight per cubic foot under standard conditions.
*5 Heating values per pound in B. T. U.

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BRASS FOUNDERS
BRASS,
COMPOSITION AND ALUMINUM CASTINGS
OF ALL KINDS
All Grades of Babbitt Metals.
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SPECIFIC HEAT OF HYDROCARBONS

In order to be able to estimate the losses in the exhaust of a motor it is necessary to know the specific heat of the elements and compounds determined by analysis of the exhaust, together with the range of temperatures, as well as the weight of the exhaust gases. The specific heat values are as follows:

Elements and Compounds	Specific Heat
Carbon	0.241
Carbon monoxide	0.2479
Oxygen	0.218
Hydrogen	0.244
Nitrogen (approximately)	0.240

Since over 80 per cent. of the whole weight of gas (mixture) will be nitrogen, it follows that much of the heat lost to the exhaust is taken away in the nitrogen. This fact, coupled with the absence of heat value, in nitrogen, tends to the contention that nitrogen is an evil without a recompense. In the absence of nitrogen, however, the fuel would be so quick-burning that the pistons would not be capable of receding rapidly enough to enable the functions to be performed, and it follows that some element has to be present, the nature of which will serve to dampen the rate of flame propagation. Nitrogen is at hand in the right proportion and the cost of its provision is therefore nil, since, as exemplified above, it has no heat value.

VISCOSITY OF GASOLINE

In considering the functioning of the gasoline carbureter, changes in viscosity of the fuel due to differences in temperature should be considered. It is a mistake to assume that because gasoline does not noticeably thicken up at the lower atmospheric temperatures (usual in the Northern States in winter) it will flow through the nozzle of a carbureter at the same rate under all heat conditions. Taking gasoline of a specific gravity of 0.71, it has been shown by experiment that the amount which will pass through a nozzle of a carbureter under a given pressure will increase as the temperature is increased in the following manner:

Temperature in ° F.	50	59	68	77	86	95
Relative flow	1	1.073	1.145	1.212	1.27	1.335

Since nozzles in carbureters are not readily adjustable, and with any degree of certainty, it follows that such a great difference in the weight of fuel ejected, considering the differences in temperature named, is bound to lead to a certain amount of carbureter inefficiency of the kind which does not readily yield to treatment.

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The "AJAX BATTERY" has the following advantages:

Is clean and compact: Is not affected by jar or vibration: Has better insulation: Will not corrode at terminals.

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Size 66 6 Volts 60 Amperes
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Geiszler Bros. Storage Battery Co.
1512-1520 WEST 57th STREET NEW YORK CITY

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MOLECULAR WEIGHT OF PETROLEUM DISTILLATES

The atomic weight of the elements entering into the fractions may be set down thus:

Hydrogen	1
Carbon	12
Oxygen	16

The molecular weight may be found as follows:

(*a*) butane, $C_4H_{10} = 4 \times 12 + 10 \times 1 = 58$;
(*b*) pentane, $C_5H_{12} = 5 \times 12 + 12 \times 1 = 72$;
(*c*) hexane, $C_6H_{14} = 6 \times 12 + 14 \times 1 = 86$;
(*d*) heptane, $C_7H_{16} = 7 \times 12 + 16 \times 1 = 100$;
(*e*) octane, $C_8H_{18} = 8 \times 12 + 18 \times 1 = 114$;
(*f*) nonane, $C_9H_{20} = 9 \times 12 + 20 \times 1 = 128$;
(*g*) decane, $C_{10}H_{22} = 10 \times 12 + 22 \times 1 = 142$.

In like manner the molecular weight of any of the compounds may be found, the rule for which may be stated as follows:

Multiply the atomic weight of each element by the number of atoms for each element and the sum of the respective products will be the molecular weight of the resultant compound.

In general practice it has been the custom to consider that gasoline was largely hexane, the molecular weight of which was taken in the further determinations. It is highly improbable that this method will serve, for the reason that hexane is not now used to the same extent as formerly and the chances are that heptane and octane will have to be taken into account.

TABLE OF APPROXIMATE CAPACITIES IN LIQUID GALLONS

1	2	3	4	5	6	7	8	9	10	Gallons	Gal'ns per Inch
5 x 12	6x18	6x24	6x36	6x42						6" diam'r	.122
	7x12	7x18	7x24	7x30	7x36	7x42	7x48			7" "	.165
		8x15	8x18	8x24	8x30	8x36	8x42	8x45	8x48	8" "	.217
		9x12	9x15	9x18	9x24	9x30	9x34	9x36	9x40	9" "	.275
					10x20	10x24	10x26	10x28	10x32	10" "	.340
						12x16	12x18	12x20	12x24	12" "	.486

10	15	20	25	30	35	40	45	50	Gallons	Gal'ns per Inch
8x48									8" diam'r	.217
9x40									9" "	.275
10x32	10x48								10" "	.340
12x24	12x34	12x42	12x50	12x60					12" "	.486
14x18	14x24	14x30	14x38	14x44	14x52	14x60			14" "	.666
	16x18	16x24	16x30	16x36	16x42	16x48	16x54	16x60	16" "	.870

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This Man Says-

"I'll eat my hat,"
If you can find
dirt, grease or fat
That can't be cleaned
quicker than scat,
With "GRIT SOAP"
made by "TAT."

Tat's Grit Soap

will absolutely remove any kind of dirt, grease or grime from the hands "quickern Scat." It is better and more efficient than ordinary soap because it works down into the pores and brings up every particle of dirt, leaving the skin soft and smooth.

Works equally well in cold or warm water, is antiseptic and absolutely free from any harmful ingredients.

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MICA TIRE POWDER

NON-CAKING.

Mica Tire Powder is acknowledged by users to be superior to all other powders. Mica will not absorb moisture, therefore will not cake or harden like Talc, Soapstone and French Chalk. Once sprinkled in the Casing it stays put.

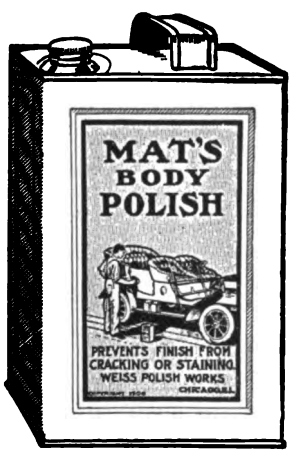
MICA FLAKE LUBRICANT

Mica Flake mixed with grease has proved the most successful and satisfactory lubricant for use in **differential and transmission gears**—reduces friction—prolongs the life or efficiency of the grease—greatly lessens the wear and makes gears run smoothly and noiselessly.

Write For Samples and Prices To-day

UNITED STATES MICA CO.
234 S. La Salle St., Chicago, Ill.

The Polish of Merit



A Body Polish and Leather Dressing.

TWO Combined IN ONE.

THE ONLY Automobile Body Polish in the Market.

Absolutely No Sediment; Contains No Acids; Requires No Shaking; Will Not Evaporate; Softens Leather and Renders It Water-proof; Gives a High and Lasting Finish.

To Claim Superiority Is One Thing, To Prove It, Another—WE DO BOTH.

Write for Free Samples and be convinced.

WEISS POLISH WORKS, Chicago, Ill.

The RAPID AUTO CLEANER & POLISH

Used Extensively Sells Quickly.

It is radically different from and superior to any other polisher and cleanser on the market. It cleans and brightens any kind of varnish and enamel and makes it look like new. It polishes, cleans and improves the leather upholstery and makes the same soft, pliable and durable, and prevents dirty, greasy appearance. It is largely used in Garages, Factories and Sample Rooms all over the country and the demand for it is constantly increasing.

A DEALER'S PROPOSITION

because it is a profitable, sales producing specialty, which the dealer cannot afford to overlook.

If you are in line for more business and are progressive, write for further information and special dealer's terms.

T. R. SHANNON,
19 Lorraine St., Hartford, Conn.

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MEASURING THE CONTENTS OF HORIZONTAL CYLINDRICAL TANKS

In a horizontally disposed cylindrical tank the contents cannot be measured without the knowledge of certain geometrical relations existing between the height at which the liquid stands and the volume it occupies. These are given hereafter: 1st, In relation of volume to height; 2nd, In relation of height to volume.

V = total volume of tank;
v = volume occupied by liquid;
D = diameter of tank;
h = height of liquid in tank.

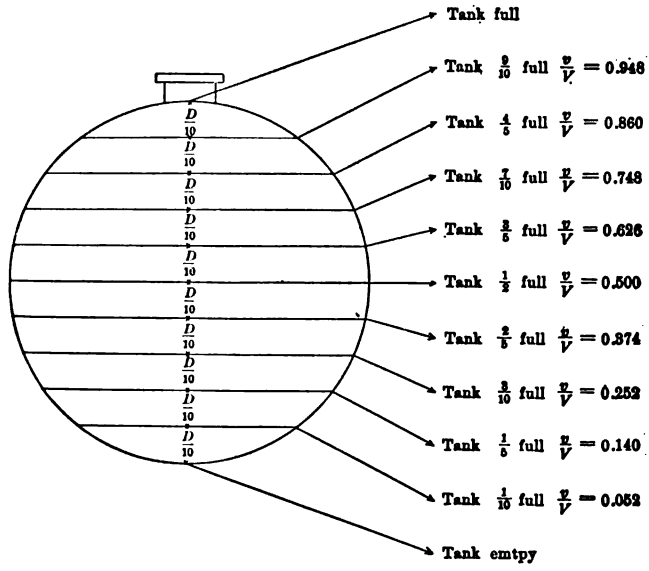

Fig. 1.—Tank divided into 10 parts of equal height. (Case in which measurement is taken with an ordinary foot rule.)

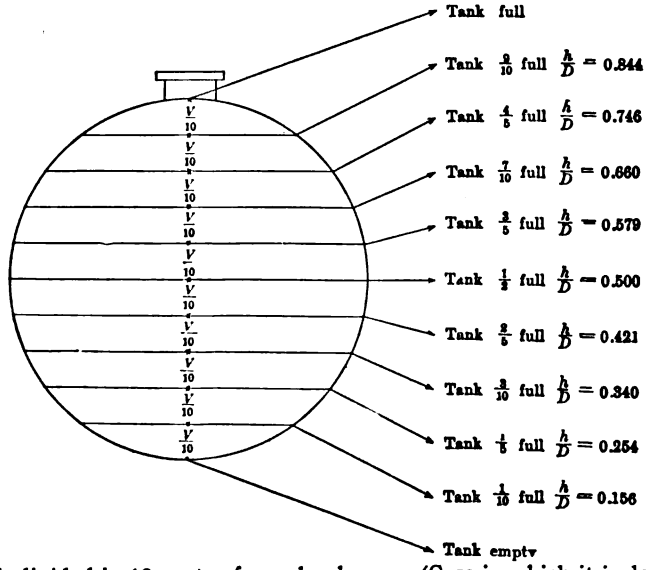

Fig. 2.—Tank divided in 10 parts of equal volume. (Case in which it is desired to make a gauge for a given tank.)

Index to Tables and Data appears on Pages 23 to 25.

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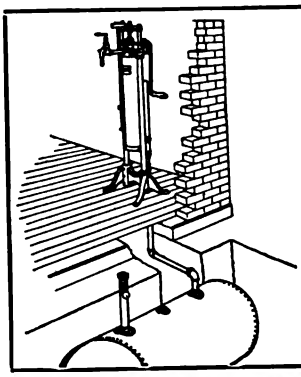
THE "KOVEN"
Galvanized Iron Gasoline Storage Tanks

ARE THE BEST AND CHEAPEST OBTAINABLE

L. O. KOVEN & BROTHER

50 CLIFF STREET, NEW YORK

WRITE FOR INFORMATION



YOU'RE looking for a long distance gasoline storage outfit which will permit you to handle your gasoline safely, economically and quickly, and one which will give accurate measure.

We manufacture it and claim that the NEIL outfit is the best on the market, and the only kind you want.

Listed by the National Board of Fire Underwriters.

SEND FOR CATALOGUE.

Wm. Neil & Company,

617 Division Street, CHICAGO, ILL.

Underground Gasolene Storage Outfits

Experience counts. We were established in 1865, and for over 44 years we have specialized in the manufacture of underground gasolene storage tanks.

WE MANUFACTURE:

Tanks, Self-Measuring Pumps, Lubricating Oil Outfits Fuel Oil Systems, Annealing Furnaces, Transfer Pumps Siphons, etc. Oil Storage Systems for Public and Private Garages. *Highest Quality. Moderate Prices. Prompt Shipments.*

Tank in Ground

Ask for Catalogue "C"

GILBERT & BARKER MFG. CO.

80 Fourth Avenue New York

193 Lyman Street, Springfield, Mass. 17 Pearl Street, Boston, Mass.

124 N. 12th St., Philadelphia, Pa.

Pump in Building

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TABLE FOR THE DIVISION OF THE CIRCUMFERENCE

Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius	Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius
3	120	1.73206	52	6.55	0.120356
4	90	1.41422	53	6.47	0.118032
5	72	1.17558	54	6.40	0.11629
6	60	1	55	6.32	0.113966
7	51.25	0.86732	56	6.25	0.111644
8	45	0.76536	57	6.18	0.1099
9	40	0.68404	58	6.12	0.108158
10	36	0.61804	59	6.06	0.106414
11	32.43	0.563	60	6	0.104672
12	30	0.51764	61	5.54	0.102928
13	27	0.4782	62	5.48	0.101186
14	25	0.4448	63	5.42	0.099442
15	24	0.41582	64	5.37	0.0977
16	22.30	0.39018	65	5.32	0.096538
17	21.10	0.36734	66	5.27	0.094794
18	20	0.3473	67	5.22	0.093632
19	18.56	0.32894	68	5.17	0.091888
20	18	0.31286	69	5.13	0.090765
21	17.08	0.29792	70	5.08	0.089564
22	16.21	0.2841	71	5.04	0.088402
23	15.39	0.272	72	5	0.087238
24	15	0.26106	73	4.55	0.085496
25	14.24	0.25066	74	4.51	0.084332
26	13.50	0.24086	75	4.48	0.083752
27	13.20	0.23218	76	4.44	0.083588
28	12.51	0.22352	77	4.40	0.081426
29	12.24	0.216	78	4.36	0.080264
30	12	0.20906	79	4.33	0.0791
31	11.36	0.20212	80	4.30	0.078518
32	11.15	0.19574	81	4.26	0.077356
33	10.54	0.18996	82	4.23	0.076194
34	10.35	0.18416	83	4.20	0.075612
35	10.17	0.17894	84	4.17	0.07445
36	10	0.17432	85	4.14	0.073868
37	9.43	0.1691	86	4.11	0.072706
38	9.28	0.16504	87	4.08	0.072124
39	9.13	0.1604	88	4.05	0.070962
40	9	0.15692	89	4.02	0.07038
41	8.46	0.15286	90	4.	0.069798
42	8.34	0.14938	91	3.57	0.0686362
43	8.22	0.1459	92	3.54	0.0680546
44	8.10	0.14242	93	3.52	0.0674732
45	8	0.13952	94	3.49	0.0663104
46	7.49	0.13603	95	3.47	0.0657288
47	7.39	0.133128	96	3.45	0.0651474
48	7.30	0.130806	97	3.42	0.064566
49	7.20	0.127904	98	3.40	0.0639844
50	7.12	0.125582	99	3.38	0.63403
51	7.03	0.122678	100	3.36	0.0628216

This table should be useful for gear and chain wheel calculation and design

Index to Tables and Data appears on Pages 23 to 25.

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Badger Creations

IN

AUTO TOPS and WIND SHIELDS

are the sensation of the 1911 Season

Dealers get our new 1911 money-saving prices

WISCONSIN AUTO TOP CO.

RACINE, WISCONSIN

AUTO TOPS!

Guaranteed to Fit Any Car

WE SHIP SUDDEN!

Extension Fairfield Rubber Tops, complete, - $36.00
Extension Imported Silk Mohair Tops, complete, - $45.00

Runabout Fairfield Rubber and Mohair Top prices with samples of material on request.

A Tip-Top Top for any car on 24 hours' notice!

3,500 MEASUREMENTS

DETROIT MOTOR CAR SUPPLY CO.

Wm. F. Cornell, Gen. Sales Mgr.
1280 JEFFERSON AVENUE
DETROIT, MICH.

TOPS

WIND SHIELDS — SEAT COVERS

WHOLESALE MANUFACTURERS

QUALITY . SERVICE . . PRICE . . . . . } **Right**

American Auto-Top Mfg. Co. Inc.

244-250 West 49th St.
New York City
Phone 4699 Bryant

OHIO

AUTO-TOPS

add the final touch of distinction

Fit, Quality & Price are RIGHT

This is easily said, but we are prepared to prove it. Our HOODS, TIRE CASES, SLIP COVERS, and the like, are in the same class.

OHIO TOP CO.

37 MAIN ST., CINCINNATI, O.

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CIRCUMFERENCES AND AREAS OF CIRCLES

ADVANCING BY EIGHTHS

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
1/64	.04909	.00019	2 3/8	7.4613	4.4301	6 1/8	19.242	29.465
1/32	.09818	.00077	7/16	7.6576	4.6664	1/4	19.635	30.680
3/64	.14726	.00173	1/2	7.8540	4.9087	3/8	20.028	31.919
1/16	.19635	.00307	9/16	8.0503	5.1572	1/2	20.420	33.183
3/32	.29452	.00690	5/8	8.2467	5.4119	5/8	20.813	34.472
1/8	.39270	.01227	11/16	8.4430	5.6727	3/4	21.206	35.785
5/32	.49087	.01917	3/4	8.6394	5.9396	7/8	21.598	37.122
3/16	.58905	.02761	13/16	8.8357	6.2126	7	21.991	38.485
7/32	.68722	.03758	7/8	9.0321	6.4918	1/8	22.384	39.871
			15/16	9.2284	6.7771	1/4	22.776	41.282
1/4	.78540	.04909				3/8	23.169	42.718
9/32	.88357	.06213	3	9.4284	7.0686	1/2	23.562	44.179
5/16	.98175	.07670	1/16	9.6211	7.3662	5/8	23.955	45.664
11/32	1.0799	.09281	1/8	9.8175	7.6699	3/4	24.347	47.173
3/8	1.1781	.11045	3/16	10.014	7.9798	7/8	24.740	48.707
13/32	1.2763	.12962	1/4	10.210	8.2958	8	25.133	50.265
7/16	1.3744	.15033	5/16	10.407	8.6179	1/8	25.525	51.849
15/32	1.4726	.17257	3/8	10.603	8.9462	1/4	25.918	53.456
			7/16	10.799	9.2806	3/8	26.311	55.088
1/2	1.5708	.19635	1/2	10.996	9.6211	1/2	26.704	56.745
17/32	1.6690	.22166	9/16	11.192	9.9678	5/8	27.096	58.426
9/16	1.7671	.24850	5/8	11.388	10.321	3/4	27.489	60.132
19/32	1.8653	.27688	11/16	11.585	10.680	7/8	27.882	61.862
5/8	1.9635	.30680	3/4	11.781	11.045	9	28.274	63.617
21/32	2.0617	.33824	13/16	11.977	11.416	1/8	28.667	65.397
11/16	2.1598	.37122	7/8	12.174	11.793	1/4	29.060	67.201
23/32	2.2580	.40574	15/16	12.370	12.177	3/8	29.452	69.029
			4	12.566	12.566	1/2	29.845	70.882
3/4	2.3562	.44179	1/16	12.763	12.962	5/8	30.238	72.760
25/32	2.4544	.47937	1/8	12.959	13.364	3/4	30.631	74.662
13/16	2.5525	.51849	3/16	13.155	13.772	7/8	31.023	76.589
27/32	2.6507	.55914	1/4	13.352	14.186	10	31.416	78.540
7/8	2.7489	.60132	5/16	13.548	14.607	1/8	31.809	80.516
29/32	2.8471	.64504	3/8	13.744	15.033	1/4	32.201	82.516
15/16	2.9452	.69029	7/16	13.941	15.466	3/8	32.594	84.541
31/32	3.0434	.73708	1/2	14.137	15.904	1/2	32.987	86.590
			9/16	14.334	16.349	5/8	33.379	88.664
1	3.1416	.7854	5/8	14.530	16.800	3/4	33.772	90.763
1/16	3.3379	.8866	11/16	14.726	17.257	7/8	34.165	92.886
1/8	3.5343	.9940	3/4	14.923	17.728	11	34.558	95.033
3/16	3.7306	1.1075	13/16	15.119	18.190	1/8	34.950	97.205
1/4	3.9270	1.2272	7/8	15.315	18.665	1/4	35.343	99.402
5/16	4.1233	1.3530	15/16	15.512	19.147	3/8	35.736	101.62
3/8	4.3197	1.4849	5	15.708	19.635	1/2	36.128	103.87
7/16	4.5160	1.6230	1/16	15.904	20.129	5/8	36.521	106.14
1/2	4.7124	1.7671	1/8	16.101	20.629	3/4	36.914	108.43
9/16	4.9087	1.9175	3/16	16.297	21.135	7/8	37.306	110.75
5/8	5.1051	2.0739	1/4	16.493	21 648	12	37.699	113.10
11/16	5.3014	2.2365	5/16	16.690	22 166	1/8	38.092	115.47
3/4	5.4978	2.4053	3/8	16.886	22 691	1/4	38.485	117.86
13/16	5.6941	2.5802	7/16	17.082	23.221	3/8	38.877	120.28
7/8	5.8905	2.7612	1/2	17.279	23.758	1/2	39.270	122.72
15/16	6.0868	2.9483	9/16	17.475	24.301	5/8	39.663	125.19
			5/8	17.671	24.850	3/4	40.055	127.68
2	6.2832	3.1416	11/16	17.868	25.406	7/8	40.448	130.19
1/16	6.4795	3.3410	3/4	18.064	25.967	13	40.841	132.73
1/8	6.6759	3.5466	13/16	18.261	26.535	1/8	41.233	135.30
3/16	6.8722	3.7583	7/8	18.457	27.109	1/4	41.626	137.89
1/4	7.0686	3.9761	15/16	18.653	27.688	3/8	42.019	140.50
5/16	7.2649	4.2000	6	18.850	28.274	1/2	42.412	143.14

Index to Tables and Data appears on Pages 23 to 25.

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"THE CHAIN THAT LASTS"

BEST Traction Chains

Cross chains made from special material case hardened.

Will outwear two pairs other kind.

Infringe no patents.

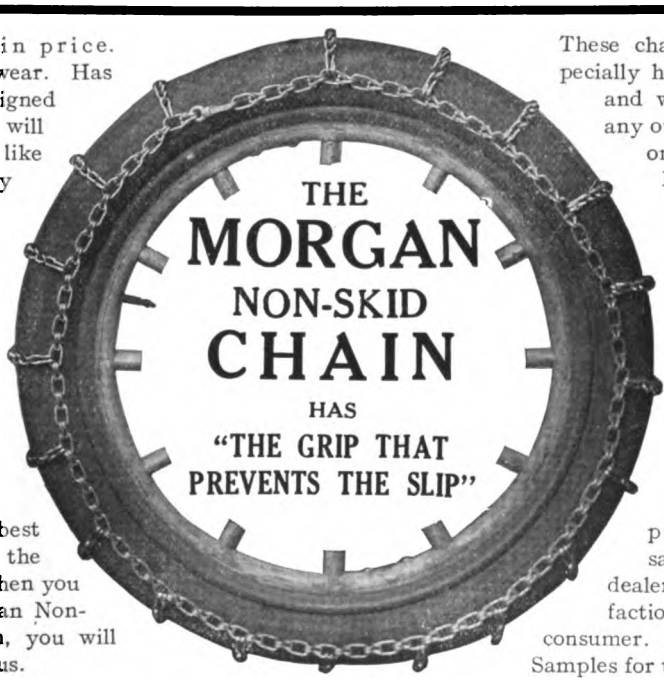
Circular and prices upon application.

PATENT APPLIED FOR

H. E. McLAIN & COMPANY

CORNER POND & HIGH STS. NATICK, MASS.

Shorter in price. Longer in wear. Has special designed snap which will not break like the ordinary snap.



These chains are especially hardened and will outlast any other chains on the market—every piece carefully tested for strength and uniformity.

5 years of automobile chain making has taught us how to make the best chain on the market. When you see a Morgan Non-Skid Chain, you will agree with us.

Morgan Non-Skid Chains mean quick and profitable sales for the dealer and satisfaction for the consumer. Certainly! Samples for the asking.

ENTERPRISE CHAIN CO., TRENTON, N. J.

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AREAS OF SMALL CIRCLES

Diameter	Areas									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0	.000078	.00031	.0007	.00125	.00196	.00283	.00385	.00503	.00636
.1	.0078	.0095	.0113	.0133	.0154	.0177	.0201	.0227	.0255	.0283
.2	.0314	.03464	.038	.0415	.0452	.0491	.0531	.0572	.0616	.066
.3	.0706	.0755	.0804	.0855	.0908	.0962	.1018	.1075	.1134	.1195
.4	.1256	.132	.1385	.1452	.1520	.1590	.1662	.1735	.181	.1886
.5	.1963	.2043	.2124	.2206	.2290	.2376	.2463	.2552	.2642	.2734
.6	.2827	.2922	.3014	.3117	.3217	.3318	.3421	.3526	.3632	.3739
.7	.3848	.3959	.4071	.4185	.4301	.4418	.4536	.4657	.4778	.4902
.8	.5026	.5153	.5281	.5411	.5542	.5674	.5809	.5945	.6082	.6221
.9	.6362	.6504	.6648	.6793	.694	.7088	.7238	.739	.7543	.7698

DECIMAL EQUIVALENTS OF FRACTIONS OF AN INCH

1/64 = .0156	17/64 = .2656	33/64 = .5156	49/64 = .7656
1/32 = .0312	9/32 = .2812	17/32 = .5312	25/32 = .7812
3/64 = .0468	19/64 = .2968	35/64 = .5468	51/64 = .7968
1/16 = .0625	5/16 = .3125	9/16 = .5625	13/16 = .8125
5/64 = .0781	21/64 = .3281	37/64 = .5781	53/64 = .8281
3/32 = .0937	11/32 = .3437	19/32 = .5937	27/32 = .8437
7/64 = .1093	23/64 = .3593	39/64 = .6093	55/64 = .8593
1/8 = .1250	3/8 = .3750	5/8 = .6250	7/8 = .8750
9/64 = .1406	25/64 = .3906	41/64 = .6406	57/64 = .8906
5/32 = .1562	13/32 = .4062	21/32 = .6562	29/32 = .9062
11/64 = .1718	27/64 = .4218	43/64 = .6718	59/64 = .9218
3/16 = .1875	7/16 = .4375	11/16 = .6875	15/16 = .9375
13/64 = .2031	29/64 = .4531	45/64 = .7031	61/64 = .9531
7/32 = .2187	15/32 = .4687	23/32 = .7187	31/32 = .9687
15/64 = .2343	31/64 = .4843	47/64 = .7343	63/64 = .9843
1/4 = .2500	1/2 = .5000	3/4 = .7500	1 = 1.0000

Index to Tables and Data appears on Pages 23 to 25.

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DEALERS--JOBBERS--GARAGES

The Hart Giant Pump

Is **guaranteed** to pump your tire to 90 pounds pressure in **less than three minutes.**

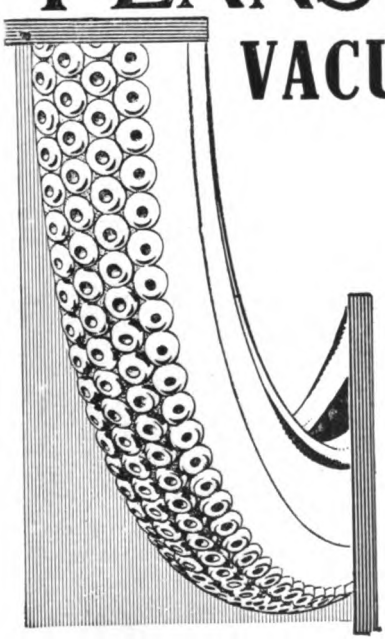
To put into operation you merely turn same on with a wrench which brings the friction drive into contact with flywheel. When required amount of air is obtained release in like manner.

The Hart Giant is a real pump; not a toy, but built on honest mechanical principles and guaranteed for one year.

We furnish with the pump 12 feet of hose, with extra connections and high-grade pressure gauge, indicating up to 150 lbs. If you want to avoid tire trouble, it will pay you to buy one of these pumps. **WRITE FOR PRICES AND DISCOUNTS.**

HART & WIDDER CO., 511 W. 21st, N. Y. City

PENNSYLVANIA



VACUUM CUP TREAD TIRES

will not skid on any road-surface, and are *guaranteed* to wear longer than any other type of non-skid tire.

Pennsylvania Rubber Co.
Jeannette, Pa.

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THERMOMETER SCALES

There are two thermometer scales in general use in the United States: Fahrenheit and Centigrade. In the Fahrenheit thermometer the temperature of melting ice is taken at 32 degrees and boiling point at 212 degrees; thus there are 180 degrees between the two extremes. In the Centigrade thermometer the distance between these two points on the scale is divided into exactly 100 degrees. In order to convert degrees Fahrenheit into degrees Centigrade: Subtract 32, multiply the remainder by 5, and divide by 9. Thus, convert 158 degrees Fahrenheit to degrees Centigrade:

$$\text{Then } (158-32)\frac{5}{9}=70^\circ \text{ Cent.}$$

Or to convert degrees Centigrade into degrees Fahrenheit: Multiply by 9, divide by 5 and add 32. Thus, convert 70 degrees Centigrade into degrees Fahrenheit:

$$\text{Then } (70\times\frac{9}{5})+32=158^\circ \text{ Fahr.}$$

Following is a table giving the equivalent degrees of the Fahrenheit and Centigrade scales, from 1 to 100 Centigrade:

Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
0	*32.0	35	95.0	70	158.0
1	33.8	36	96.8	71	159.8
2	35.6	37	98.6	72	161.6
3	37.4	38	100.4	73	163.4
4	39.2	39	102.2	74	165.2
5	41.0	40	104.0	75	167.0
6	42.8	41	105.8	76	168.8
7	44.6	42	107.6	77	170.6
8	46.4	43	109.4	78	172.4
9	48.2	44	111.2	79	174.2
10	50.0	45	113.0	80	176.0
11	51.8	46	114.8	81	177.8
12	53.6	47	116.6	82	179.6
13	55.4	48	118.4	83	181.4
14	57.2	49	120.2	84	183.2
15	59.0	50	122.0	85	185.0
16	60.8	51	123.8	86	186.8
17	62.6	52	125.6	87	188.6
18	64.4	53	127.4	88	190.4
19	66.2	54	129 2	89	192.2
20	68.0	55	131.0	90	194.0
21	69.8	56	132 8	91	195.8
22	71.6	57	134.6	92	197.6
23	73.4	58	136.4	93	199.4
24	75.2	59	138.2	94	201.2
25	77.0	60	140.0	95	203.0
26	78.8	61	141.8	96	204.8
27	80.6	62	143.6	97	206.6
28	82.4	63	145.4	98	208.4
29	84.2	64	147.2	99	210.2
30	86.0	65	149.0	100	†212.0
31	87.8	66	150.8	..	.....
32	89.6	67	152.6	..	.....
33	91.4	68	154.4	..	.....
34	93.2	69	156.2	..	.....

* Freezing point.
† Boiling point.

It will be noticed that for each degree Centigrade the Fahrenheit scale rises 1.8 degrees, so that if we multiply the degrees Centigrade by 1.8 and add 32 we will get the equivalent number of degrees Fahrenheit. In the Fahrenheit thermometer the freezing and boiling points of water are taken at the mean atmospheric pressure at the sea level, 14.7 pounds to the square inch.

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The Detroit Testing Laboratory

1111 Union Trust Building
DETROIT

EXPERTS IN

Chemical and Physical Testing of Metals
Fuel Engineering
Cement Inspection
Heat Treatment of Iron and Steel
Metallography
Foundry Practice

MURRAY SUPPORTED TIRE BOX

JOSEPH MURRAY, Maker
NEWTON, MASS.

A Round Tire box fitting within the spare tires and rigidly supported from the running board.

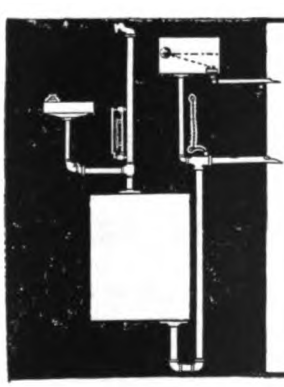
The *Ideal Tire Carrier.* No tire carrier irons needed. Boxes guaranteed not to collapse or bulge.

LANGSENKAMPS ALUMINUM SOLDER

ALWAYS READY FOR USE

No flux required. The ingredients are contained in the solder itself. Is the strongest Aluminum Solder made and harder than Aluminum itself. It solders Aluminum to Brass, Steel, Copper and other metals as perfectly as to aluminum itself.
The casting will break before the solder can be torn apart.
A positive guarantee with every pound if used according to directions.

F. H. LANGSENKAMP, 134 East Georgia St., Indianapolis, Ind.



The Hydraulic System of Gasolene Storage

MEANS

Full Tank — Top Feed

No Dirt — No Water — No Evaporation

Think it over

You want circulars, well write to

HYDRAULIC OIL STORAGE COMPANY

90 West Street, NEW YORK, or Penobscot Building, DETROIT, MICH.

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FORMULAS FOR CONVERSION OF THERMOMETER SCALES

To convert degrees, Centigrade or Réaumur, into degrees Fahrenheit:

Let F = No. of degrees Fahrenheit.
C = " " " Centigrade.
R = " " " Réaumur.

$$F = \frac{9C}{5} + 32; \qquad F = \frac{9R}{4} + 32;$$

$$C = \frac{5(F - 32)}{9} \qquad R = \frac{4(F - 32)}{9}$$

Freezing point, or 32° Fah. = zero in Cent. or Réaumur.
Boiling point, or 212° Fah. = 100° Cent., or 80° Réaumur.

BAUME HYDROMETER AND SPECIFIC GRAVITY EQUIVALENTS (AMERICAN STANDARD)

For liquids heavier than water,

$$\text{Sp. Gr.} = \frac{145}{145 - {}^\circ\text{Bé}} \text{ at } 60^\circ \text{ F.}$$

Baumé	Specific Gravity	Baumé	Specific Gravity	Baumé	Specific Gravity
0.0	1.000	17.5	1.137	35.0	1.318
0.5	1.003	18.0	1.141	36.0	1.330
1.0	1.006	18.5	1.146	37.0	1.342
1.5	1.010	19.0	1.150	38.0	1.355
2.0	1.014	19.5	1.155	39.0	1.367
2.5	1.017	20.0	1.160	40.0	1.381
3.0	1.021	20.5	1.164	45.0	1.450
3.5	1.024	21.0	1.169	50.0	1.526
4.0	1.028	21.5	1.174	55.0	1.611
4.5	1.032	22.0	1.178	60.0	1.705
5.0	1.035	22.5	1.183	65.0	1.812
5.5	1.039	23.0	1.188	70.0	1.933
6.0	1.043	23.5	1.193	....	.....
6.5	1.046	24.0	1.198	....	.....
7.0	1.050	24.5	1.203	....	.....
7.5	1.054	25.0	1.208	....	.....
8.0	1.058	25.5	1.213	....	.....
8.5	1.062	26.0	1.218	....	.....
9.0	1.066	26.5	1.223	....	.....
9.5	1.070	27.0	1.228	....	.....
10.0	1.074	27.5	1.234	....	.....
10.5	1.078	28.0	1.239	....	.....
11.0	1.082	28.5	1.244	....	.....
11.5	1.086	29.0	1.250	....	.....
12.0	1.090	29.5	1.255	....	.....
12.5	1.094	30.0	1.260	....	.....
13.0	1.098	30.5	1.266	....	.....
13.5	1.102	31.0	1.271	....	.....
14.0	1.106	31.5	1.277	....	.....
14.5	1.111	32.0	1.283	....	.....
15.0	1.115	32.5	1.288	....	.....
15.5	1.119	33.0	1.294	....	.....
16.0	1.124	33.5	1.300	....	....
16.5	1.128	34.0	1.306	....	.....
17.0	1.132	34.5	1.312	....	.....

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Kelly-Springfield AUTOMOBILE TIRES

There is no getting around the fact that service in an automobile tire does depend on the quality of the tire itself. The quality of the Kelly-Springfield Automobile Tire is the quality of the now world-famous Kelly-Springfield Vehicle Tire.

"Thanks for providing me with tires which allow us to stay in the car and ride rather than to stay on the road and pump."—*Philip A. Rollins.*
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CONSOLIDATED RUBBER TIRE COMPANY

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It is the one Speed Indicator sturdy enough to outlast a dozen cars and so refined in construction that it never loses its marvelous Accuracy at all speeds from zero to 100 miles per hour.

The Warner is the choice of every Motorist who appreciates Quality and can afford its purchase.

WARNER INSTRUMENT CO.

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BOSTON, 925 Boylston St.
BUFFALO, 720 Main St.
CHICAGO, 2420 Michigan Avenue
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CLEVELAND, 2062 Euclid Avenue
DENVER, 1518 Broadway
DETROIT, 870 Woodward Avenue
INDIANAPOLIS, 331 N. Illinois Street
KANSAS CITY, 1613 Grand Avenue
LOS ANGELES, 748 S. Olive Street
NEW YORK, 1902 Broadway
PHILADELPHIA, 3[illegible]2 N. Broad Street
PITTSBURG, 59[illegible]0 Kirkwood Street
PORTLAND, ORE., 14 N Seventh Street
SAN FRANCISCO, 3[illegible] Van Ness Avenue
SEATTLE, 611 E. Pike St.
ST. LOUIS, 3923 Olive St.

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BOILING POINT OF WATER AT VARIOUS ALTITUDES

Altitude Above Sea Level in Feet	Boiling Point of Water in Degrees Fahrenheit
1,025	212
2,063	210
3,115	208
4,169	206
5,225	204
6,304	202
7.381	200
8,431	198
9,579	196
10,685	194
	192

It is considered good practice to maintain the temperature of the water in an automobile motor cooling system at about 202 degrees Fahrenheit, under normal operating conditions. This allows a working margin, under boiling point, for adverse conditions, such as climbing a long grade, car standing with motor running idle, or running with a retarded spark. Such a system would steam when a car running under normal conditions attained an altitude of about one mile. In cases where steaming occurs under normal conditions, at sea level, mountain climbing is practically impossible or necessitates very frequent stops for water to make up for evaporation.

DECIMAL FRACTIONS OF A LINEAL INCH IN MILLIMETRES

Inch	Milli-metres	Inch	Milli-metres	Inch	Milli-metres	Inches	Milli-metres
.01	.254	.29	7.366	.57	14.478	.85	21.590
.02	.508	.30	7.620	.58	14.732	.86	21.844
.03	.762	.31	7.874	.59	14.986	.87	22.098
.04	1.016	.32	8.128	.60	15.240	.88	22.352
.05	1.270	.33	8.382	.61	15.494	.89	22.606
.06	1.254	.34	8.636	.62	15.748	.90	22.860
.07	1.778	.35	8.890	.63	16.002	.91	23.114
.08	2.032	.36	9.114	.64	16.256	.92	23.368
.09	2.286	.37	9.398	.65	16.510	.93	23.622
.10	2.540	.38	9.652	.66	16.764	.94	23.876
.11	2.794	.39	9.906	.67	17.018	.95	24.130
.12	3.048	.40	10.160	.68	17.272	.96	24.384
.13	3.302	.41	10.414	.69	17.526	.97	24.638
.14	3.556	.42	10.668	.70	17.780	.98	24.892
.15	3.810	.43	10.922	.71	18.034	.99	25.146
.16	4.064	.44	11.176	.72	18.288	1.00	25.400
.17	4.318	.45	11.430	.73	18.542	2.00	50.799
.18	4.572	.46	11.684	.74	18.796	3.00	76.199
.19	4.826	.47	11.938	.75	19.050	4.00	101.598
.20	5.080	.48	12.192	.76	19.304	5.00	126.998
.21	5.334	.49	12.446	.77	19.558	6.00	152.397
.22	5.588	.50	12.700	.78	19.812	7.00	177.797
.23	5.842	.51	12.945	.79	20.066	8.00	203.196
.24	6.096	.52	13.208	.80	20.320	9.00	228.596
.25	6.350	.53	13.462	.81	20.574	10.00	253.995
.26	6.604	.54	13.716	.82	20.828	11.00	279.395
.27	6.858	.55	13.970	.83	21.082	12.00 = 1 foot	304.794
.28	7.112	.56	14.224	.84	21.336		

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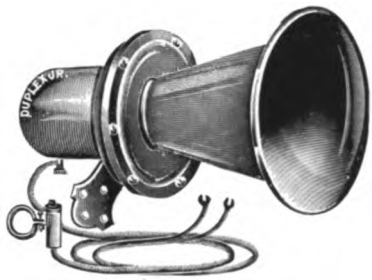

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No moving parts. Nothing to adjust or get out of order. Operates from a 6-volt storage or 6 dry cells. Every horn guaranteed for ONE YEAR. We have a very attractive offer for dealers.

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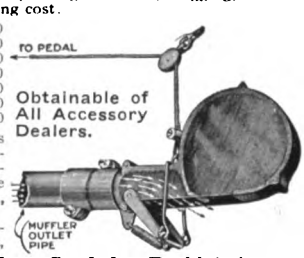
JERICHO
THE PERFECT MOTOR CAR SIGNAL

Made of Aluminum. Largest size, 11" x 5". Weight, including attaching coupling, 3 lbs.
Always attached in *rear* of Muffler—either clamped over outlet pipe or threaded into Muffler by threaded coupling.
Exhaust flows freely through open Horn-throat when Horn is not in use, keeping the Horn clear. Depressing pedal closes lid, directing exhaust through shallow slot and across sound-chamber opening.
A single, mellow, distinctive note at low speed—effective without offense.
In touring becomes a powerful warning heard one to three miles.
No back-pressure, racing of motor, clogging, nor expensive attaching cost.

No. 0...$7.00
" 1... 7.00
" 2... 8.00
" 3... 9.00
" 4...10.00
*" 23... 9.00
*" 24...10.00

Price includes brass pedal, attaching coupling, cable, cable clamps, pulley, etc.
*These have larger couplings, for larger exhaust pipes.



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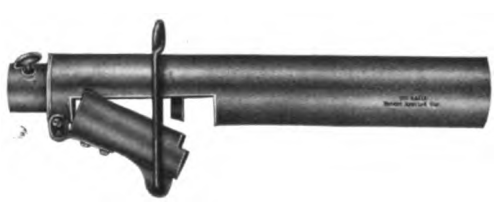
THE EAGLE WHISTLE



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Easiest to Attach No Back Pressure Can't Clog It Up

At will of operator you can scare a cow half a mile away—and you know how hard it is to scare a cow—or soothe a fretful infant in the car.

Equally effective at ninety miles an hour, or crawling through the most crowded traffic.

Prices: $10 for 1½-in. Whistle, and $15 for a regular fog-horn

Agents wanted everywhere—it's a snap to sell it. Write for particulars.

EAGLE WHISTLE COMPANY
BOSTON, MASS.

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UNITED STATES OFFICIAL MILLIMETERS CONVERSION TABLE

Millimeters	Equivalent in Inches	Millimeters	Equivalent in Inches
1	0.03,937	51	2.00,787
2	0.07,874	52	2.04,724
3	0.11,811	53	2.08,661
4	0.15,748	54	2.12,598
5	0.19,685	55	2.16,535
6	0.23,622	56	2.20,472
7	0.27,559	57	2.24,409
8	0.31,496	58	2.28,346
9	0.35,433	59	2.32,283
10	0.39,370	60	2.36,220
11	0.43,307	61	2.40,157
12	0.47,244	62	2.44,094
13	0.51,181	63	2.48,031
14	0.55,118	64	2.51,968
15	0.59,055	65	2.55,905
16	0.62,992	66	2.59,842
17	0.66,929	67	2.63,779
18	0.70,866	68	2.67,716
19	0.74,803	69	2.71,653
20	0.78,740	70	2.75,590
21	0.82,677	71	2.79,527
22	0.86,614	72	2.83,464
23	0.90,551	73	2.87,401
24	0.94,488	74	2.91,338
25	0.98,425	75	2.95,275
26	1.02,362	76	2.99,212
27	1.06,299	77	3.03,149
28	1.10,236	78	3.07,086
29	1.14,173	79	3.11,023
30	1.18,110	80	3.14,960
31	1.22,047	81	3.18,897
32	1.25,984	82	3.22,834
33	1.29,921	83	3.26,771
34	1.33,858	84	3.30,708
35	1.37,795	85	3.34,645
36	1.41,732	86	3.38,582
37	1.45,669	87	3.42,519
38	1.49,606	88	3.46,456
39	1.53,543	89	3.50,393
40	1.57,480	90	3.54,330
41	1.61,417	91	3.58,267
42	1.65,354	92	3.62,204
43	1.69,291	93	3.66,141
44	1.73,228	94	3.70,078
45	1.77,165	95	3.74,015
46	1.81,102	96	3.77,952
47	1.85,039	97	3.81,889
48	1.88,976	98	3.85,826
49	1.92,913	99	3.89,763
50	1.96,850	100	3.93,700

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IF IT IS

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WHY NOT USE IT?

JEFFERSON

UNION

MADE OF

MALLEABLE IRON

MUCH STRONGER AND MORE EFFICIENT THAN BRASS

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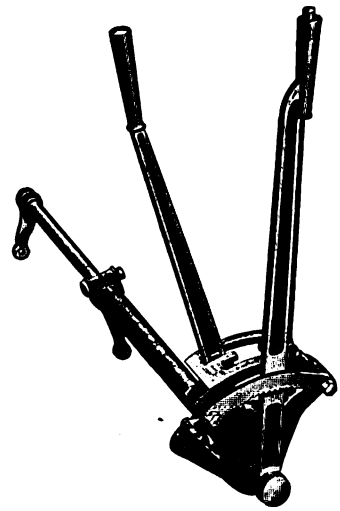

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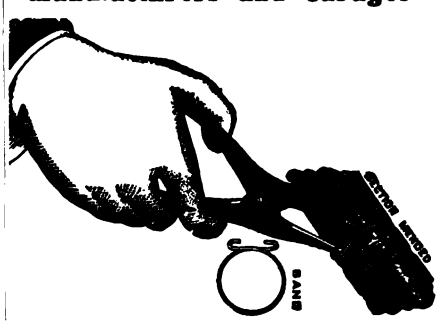

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POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE

Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre
1	.0703	41	2.8826	81	5.6949	205	14.4129
2	.1406	42	2.9529	82	5.7652	210	14.7645
3	.2109	43	3.0232	83	5.8355	215	15.1160
4	.2812	44	3.0935	84	5.9058	220	15.4675
5	.3515	45	3.1638	85	5.9761	225	15.8191
6	.4218	46	3.2341	86	6.0464	230	16.1706
7	.4921	47	3.3044	87	6.1167	235	16.5221
8	.5624	48	3.3747	88	6.1870	240	16.8737
9	.6328	49	3.4450	89	6.2573	245	17.2252
10	.7031	50	3.5153	90	6.3276	250	17.5767
11	.7734	51	3.5856	91	6.3979	255	17.9283
12	.8437	52	3.6559	92	6.4682	260	18.2798
13	.9140	53	3.7263	93	6.5385	265	18.6313
14	.9843	54	3.7966	94	6.6088	270	18.9829
15	1.0546	55	3.8669	95	6.6722	275	19.3344
16	1.1249	56	3.9372	96	6.7495	280	19.6860
17	1.1952	57	4.0075	97	6.8198	285	20.0375
18	1.2655	58	4.0778	98	6.8901	290	20.3890
19	1.3358	59	4.1481	99	6.9604	295	20.7406
20	1.4062	60	4.2184	100	7.0307	300	21.0921
21	1.4764	61	4.2887	105	7.3822	310	21.7951
22	1.5467	62	4.3590	110	7.7338	320	22.4981
23	1.6171	63	4.4293	115	8.0853	330	23.2012
24	1.6874	64	4.4996	120	8.4368	340	23.9043
25	1.7577	65	4.5699	125	8.7884	350	24.6073
26	1.8280	66	4.6402	130	9.1399	360	25.3104
27	1.8983	67	4.7106	135	9.4914	370	26.0135
28	1.9686	68	4.7809	140	9.8430	380	26.7166
29	2.0389	69	4.8512	145	10.1945	390	27.4196
30	2.1092	70	4.9215	150	10.5460	400	28.1227
31	2.1795	71	4.9918	155	10.8976	410	28.8258
32	2.2498	72	5.0621	160	11.2491	420	29.5288
33	2.3201	73	5.1324	165	11.6006	430	30.2319
34	2.3905	74	5.2027	170	11.9522	440	30.9350
35	2.4607	75	5.2730	175	12.3037	450	31.6380
36	2.5310	76	5.3433	180	12.6553	460	32.3411
37	2.6013	77	5.4136	185	13.0068	470	33.0442
38	2.6717	78	5.4939	190	13.3583	480	33.7437
39	2.7420	79	5.5542	195	13.7099	490	34.4503
40	2.8123	80	5.6246	200	14.0614	500	35.1533

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Manufacturers and Repairers of Automobile Radiators

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QUICK SERVICE

Manufacturer of the

Spencer Gear Driven Pump

IT IS ATTACHED TO THE AUTO AND THE ENGINE DOES THE WORK.
WRITE FOR PRICES.

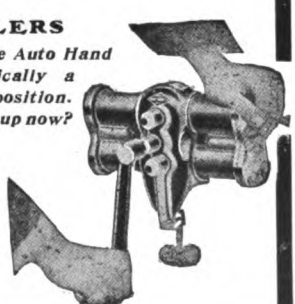
DELIGHTED!
WITH THE
HAWTHORNE
4 CYL. AUTO HAND AIR PUMP

THOUSANDS of motorists are daily expressing their pleasure at its labor saving results. It is used on the car, in the garage, factory or any other place where a pump can be used and its evident merit and obvious utility make an instantaneous appeal to the purchaser. Therefore,

DEALERS

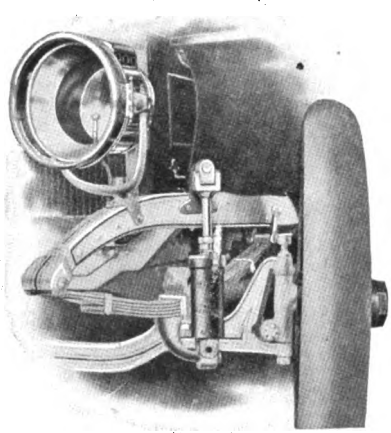
The Hawthorne Auto Hand Pump is logically a dealer's proposition. Why not stock up now?

Write for our Dealer's Terms!



Hawthorne Mfg. Co., Inc.
29 Spruce St., Bridgeport, Conn.

THE B-K SHOCK ABSORBER



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The latest invention in Hydraulic Shock Absorbers. Checks the last part of the down motion. Checks the last part of the recoil. Does not work on the very small jounces.

We have special hangers for every car on the American market.

Write for booklet.

B-K MANUFACTURING CO.
96-102 HIGH STREET, .·. .·. BOSTON

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A CONVENIENT METRIC CONVERSION (COMPILED BY C. W. HUNT)

Millimeters × .03937 = inches.
Millimeters ÷ 25.4 = inches.
Centimeters × .3937 = inches.
Centimeters ÷ 2.54 = inches.
Meters = 39.37 inches. (Act of Congress.)
Meters × 3.281 = feet.
Meters × 1.094 = yards.
Meter per second = 196.86 feet per minute.
Kilometers × .621 = miles.
Kilometers × 3280.7 = feet.
Square Millimeters × .00155 = square inches.
Square Millimeters ÷ 645.1 = square inches.
Square Centimeters × .155 = square inches.
Square Centimeters ÷ 6.451 = square inches.
Square Meters × 10.764 = square feet.
Square Kilometers × 247.1 = acres.
Hectares × 2.471 = acres.
Cubic Centimeters ÷ 16.383 = cubic inches.
Cubic Meters × 35.315 = cubic feet.
Cubic Meters × 1.308 = cubic yards.
Cubic Meters × 264.2 = gallons (231 cubic inches).
Liters × 61.022 = cubic inches. (Act of Congress.)
Liters × .2642 = gallons (231 cubic inches).
Liters ÷ 3.78 = gallons (231 cubic inches).
Liters ÷ 28.316 = cubic feet.
Grammes × 15.432 = grains. (Act of Congress.)
Grammes (water) ÷ 29.57 = fluid ounces.
Grammes ÷ 28.35 = ounces avoirdupois.
Grammes per cubic cent. ÷ 27.7 = pounds per cubic inch.
Joule × .7373 = foot pounds.
Kilograms × 2.2046 = pounds.
Kilograms × 35.3 = ounces avoirdupois.
Kilograms ÷ 1102.3 = tons (2,000 pounds).
Kilograms per square millimeters × 1422.3 = pounds per square inch
Kilograms per square cent. × 14 223 = pounds per square inch.
Kilo-watts × 1.34 = horse-power.
Watts ÷ 746 = horse-power.
Caloric × 3.968 = B. T. U.
Cheval vapeur × .9863 = horse-power.
(Centigrade × 1.8) + 32 = degrees Fahrenheit.
Francs × .193 = dollars.

FRENCH AND AMERICAN EQUIVALENT MEASURES

MEASURES OF LENGTH

French	*United States*
1 meter	39.37 inches, or 3.28083 feet
.3048 meter	1 foot
1 centimeter	.3937 inch
2.54 centimeters	1 inch
1 millimeter	.03937 inch, or 1/25 inch nearly
25.4 millimeters	1 inch
1 kilometer	1093.61 yards, or .62137 mile

(Continued on page 676)

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Seamless Steel

TUBING

For Automobile and Mechanical Construction.

STEEL AND IRON

for all special purposes.

Great assortment and large stock carried.

E. K. Morris & Co.

311-313-315-317 W. 2d St.

CINCINNATI, Ohio

Muncie Foundry & Machine Co.

Muncie, Indiana

High Grade Automobile Cylinder Castings

We will be pleased to submit figures on your requirements

High Grade

Machine Work

of

Every Description

Spare parts for any foreign or domestic car. Metric screw and gear cutting

Send B—P's for Estimates

EXPERT AUTOMOBILE REPAIRING

HENRI J. HOUPERT

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FARRELL-CHECK

STEEL FOUNDRY CO

SANDUSKY-OHIO

"Good Castings & Prompt Delivery for Particular People"

Automobile Castings Our Specialty

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MEASURES OF WEIGHT

1 gramme	15.432 grains
.0648 gramme	1 grain
28.35 grammes	1 ounce avoirdupois
1 kilogramme	2.2046 pounds
.4536 kilogramme	1 pound
1 tonne or metric ton	.0842 ton of 2,240 pounds 19.68 cwt.
1000 kilogrammes	2204.6 pounds

MEASURES OF CAPACITY

1 liter (1 cubic decimeter)	61.023 cubic inches .03531 cubic foot .2642 gallon (American) 2.202 pounds water at 62° F.
28.317 liters	1 cubic foot
4.543 liters	1 gallon (British)
3.785 liters	1 gallon (American)

TABLE OF KILOGRAMME CALORIES, EQUIVALENT TO BRITISH THERMAL UNITS

Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l
0	.....	.252	.504	.756	1.008	1.260	1.512	1.764	2.016	2.268	0
10	2.52	2.772	3.024	3.276	3.528	3.780	4.032	4.284	4.536	4.788	10
20	5.04	5.292	5.544	5.796	6.048	6.300	6.552	6.804	7.056	7.308	20
30	7.56	7.812	8.064	8.316	8.568	8.820	9.072	9.324	9.576	9.828	30
40	10.08	10.332	10.584	10.836	11.088	11.340	11.592	11.844	12.096	12.348	40
50	12.60	12.852	13.104	13.356	13.608	13.860	14.112	14.364	14.616	14.868	50
60	15.12	15.372	15.624	15.876	16.128	16.380	16.632	16.884	17.136	17.388	60
70	17.64	17.892	18.144	18.396	18.648	18.900	19.152	19.404	19.656	19.908	70
80	20.16	20.412	20.664	20.916	21.168	21.420	21.672	21.924	22.176	22.428	80
90	22.68	22.932	23.184	23.436	23.688	23.940	24.192	24.444	24.696	24.948	90
Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l

1 British thermal unit = 251.996 therms, or gramme calories.

Index to Tables and Data appears on Pages 23 to 25.

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No More Cranking Accidents!

Your motor cannot backfire if it is equipped with the

REMY MAGNETO

"Best in the World"

Hottest Spark at Low Speeds. Greatest Range for Advance and Retard. Nothing on the dash but a kick-switch.

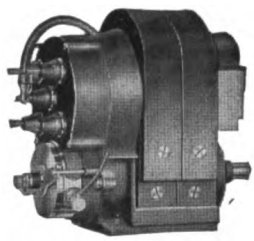
Remy Electric Company
Anderson, Indiana Dept. 28.

Branch Distributing Offices:
1400-1402 Michigan Ave., Chicago
Automobile Building, 64th and Broadway, New York City
471 Woodward Ave., Detroit
406 East 15th St., Kansas City
170 Golden Gate Ave., San Francisco
214 Pleasant Street, Boston

AGENCIES:
Auto Equipment Co., 1518 Broadway, Denver, Colo.
Hollis Electric Co., 9 N. Sixth St., Minneapolis, Minn.
J. H. McCullough & Son, 219 N. Broad St. Philadelphia, Pa.

IT IS NOT NECESSARY TO GO ABROAD

It used to be—not long ago—the proper thing to look to Europe for a Magneto that would meet requirements. Now it's different, for the Pfanstiehl not only boasts as good workmanship as any Magneto in the world, but enjoys palpable advantages peculiarly its own. High tension and deal combined—entirely self contained—perfect sparking at low speed—independence of a battery—high tension wiring guaranteed for five years—these are but a few of the reasons for Pfanstiehl supremacy.



Pfanstiehl—The Perfect Magneto

It will start a machine *alone* and at as low a speed as it will turn over—without stalling. The construction of the breaker box is simplicity itself. The high-tension windings are placed under the arch of the magnets, insuring perfect insulation.
Write for Bulletin No. 10.

Pfanstiehl Electrical Laboratory
119 State St., North Chicago, Ill.

Mr. Manufacturer:
Equip your cars for 1911 with
Benford's New Monarch Spark Plugs.

We guarantee these to your customer for one year's continual use which cuts down the running expenses of your car.

We are the largest and only producers of spark plugs from the rolled bar to the finished article.

Write us for samples and price.

We are also manufacturers of high-grade timers at interesting prices.

Benford Mfg. Company
MT. VERNON, N. Y.

Patented
Pat. Appl'd for March, 1902

BEST
TRADE MARK

Other Pat's Pending
Other Pat's Allowed

SPARK PLUGS

"THE BEST ALL THE TIME"

PROOF

Nov. 27, 1909.
Best Ignition Equipment Co.,
Gentlemen:
I have two "F" cars, and on account of the oiling system I had great trouble with spark plugs, and I kept trying different kinds of plugs, until I now have nearly a box full. I have tried —, —, —, —, and all the popular makes, and at last I bought a set of "Best" Plugs and I am now happy to say that all spark plug troubles are over. I can also say that I find quite an increase in power.
I am advising all my friends to use "Best" Spark Plugs. I am
Yours respectfully,
ALBERT E. STACY.

THE BEST IGNITION EQUIPMENT CO.
DEPT. A. D.
200 WEST 64th ST. NEW YORK

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LIST OF NINE DIFFERENT STANDARD GAUGES USED IN THE UNITED STATES

DECIMAL EQUIVALENTS (Inches)

No. of Gauge	American or Brown & Sharpe Iron Wire	Birmingham or Stubbs Iron Wire	Washburn & Moen Iron Wire	Imperial Wire Gauge	U. S. Standard for Plate (Iron & Steel)	Stubbs Steel Wire	Twist Drill and Steel Wire	Washburn & Moen Music Wire	Wood and Machine Screws	No. of Gauge	Fractional Parts of an Inch	Decimal Equiv. of Sixty-fourths, etc.
8–0	.....	.....	.....	.....	.....	.....	This gauge	.0083	....	8–0	1/64	.01563
7–0	.....	.....	.....	.....	.500	.....	from one to	.0087	....	7–0	1/32	.03125
6–0	.....	.....	.....	.464	.469	.....	three thous-	.0095	....	6–0	1/16	.625
5–0	.....	.....	.....	.432	.438	.....	andths larger	.010	....	5–0	5/64	.07813
4–0	.460	.454	.394	.400	.406	.....	than same Nos.	.011	....	4–0	3/32	.09375
3–0	.410	.425	.363	.372	.375	.....	of Stubbs steel	.012	.032	3–0	7/64	.10938
2–0	.365	.380	.331	.348	.344	.....	wire gauge	.013	.045	2–0	1/8	.125
0	.325	.340	.307	.334	.313	.....		.014	.058	0	9/64	.14063
1	.289	.300	.283	.300	.281	.277	.228	.016	.071	1	5/32	.15625
2	.258	.284	.263	.276	.266	.219	.221	.017	.084	2	11/64	.17188
3	.229	.259	.244	.252	.250	.212	.213	.018	.097	3	3/16	.1875
4	.204	.238	.225	.232	.234	.207	.209	.019	.110	4	13/64	.20313
5	.182	.220	.207	.212	.219	.204	.206	.020	.124	5	7/32	.21875
6	.162	.203	.192	.192	.203	.201	.204	.022	.137	6	15/64	.23438
7	.144	.180	.177	.176	.188	.199	.201	.023	.150	7	1/4	.25
8	.128	.165	.162	.160	.172	.197	.199	.024	.163	8	17/64	.26563
9	.114	.148	.148	.144	.156	.194	.196	.026	.176	9	9/32	.28125
10	.102	.134	.135	.128	.141	.191	.194	.027	.189	10	19/64	.29688
11	.091	.120	.121	.116	.125	.188	.191	.028	.203	11	5/16	.3125
12	.081	.109	.106	.104	.109	.185	.189	.030	.216	12	21/64	.32813
13	.072	.095	.092	.092	.094	.182	.185	.031	.229	13	11/32	.34375
14	.064	.083	.080	.080	.078	.180	.182	.033	.242	14	23/64	.35938
15	.057	.072	.072	.072	.070	.178	.180	.035	.255	15	3/8	.375
16	.051	.065	.063	.064	.063	.175	.177	.036	.268	16	25/64	.39063
17	.045	.058	.054	.056	.056	.172	.173	.038	.282	17	13/32	.40625
18	.040	.049	.048	.048	.050	.168	.170	.040	.295	18	27/64	.42188
19	.036	.042	.041	.040	.044	.164	.166	.041	.308	19	7/16	.4375
20	.032	.035	.035	.036	.038	.161	.161	.043	.321	20	29/64	.45313
21	.028	.032	.032	.032	.034	.157	.159	.046	.334	21	15/32	.46875
22	.025	.028	.029	.028	.031	.155	.157	.048	.347	22	31/64	.48438
23	.023	.025	.026	.024	.028	.153	.154	.051	.360	23	1/2	.5
24	.020	.022	.023	.022	.025	.151	.152	.055	.374	24	33/64	.51563
25	.018	.020	.020	.020	.022	.148	.150	.059	.387	25	17/32	.53125
26	.016	.018	.018	.018	.019	.146	.147	.063	.400	26	35/64	.54688
27	.0141	.016	.0173	.0164	.0171	.143	.144	.066	.413	27	9/16	.5625
28	.0126	.014	.0162	.0149	.0156	.139	.141	.072	.426	28	37/64	.57813
29	.0112	.013	.015	.0136	.014	.134	.136	.076	.439	29	19/32	.59375
30	.010	.012	.014	.0124	.0125	.127	.129	.080	.453	30	39/64	.60938
31	.0089	.010	.0132	.0116	.0109	.120	.120	....	.466	31	5/8	.625
32	.0079	.009	.0128	.0108	.0101	.115	.116	....	.479	32	41/64	.64063
33	.007	.008	.0118	.010	.0093	.112	.113	....	.492	33	21/32	.65625
34	.0063	.007	.0104	.0092	.0085	.110	.111	....	.505	34	43/64	.67188
35	.0056	.005	.0095	.0084	.0078	.108	.110	....	.518	35	11/16	.6875
36	005	.004	.009	.0076	.007	.106	.1065	....	.532	36	45/64	.70313
37	.0044	.....	.....	.0068	.0066	.103	.104	....	.545	37	23/32	.71875
38	.0039	.....	.....	.006	.0062	.101	.1015	....	.558	38	47/64	.73438
39	.0035	.....	.....	.0052	.....	.099	.0995	....	.571	39	3/4	.75
40	.0031	.....	.....	.0048	.....	.097	.098	....	.584	40	49/64	.76563
41	.....	.....	.....	.....	.....	.095	.096	....	.597	41	25/32	.78125
42	.....	.....	.....	.....	.....	.092	.094	....	.611	42	51/64	.79688
43	.....	.....	.....	.....	.....	.088	.089	....	.624	43	13/16	.8125
44	.....	.....	.....	.....	.....	.085	.086	....	.637	44	53/64	.82813
45	.....	.....	.....	.....	.....	.081	.082	....	.650	45	27/32	.84375
46	.....	.....	.....	.....	.....	.079	.081	....	.663	46	55/64	.85938
47	.....	.....	.....	.....	.....	.077	.079	....	.676	47	7/8	.875
48	.....	.....	.....	.....	.....	.075	.076	....	.690	48	57/64	.89063
49	.....	.....	.....	.....	.....	.072	.073	....	.703	49	29/32	.90625
50	.....	.....	.....	.....	.....	.069	.070	....	.716	50	59/64	.92188

Letter Sizes Stubbs Steel Wire

A	.234	I	.272	R	.339
B	.238	J	.277	S	.348
C	.242	K	.281	T	.358
D	.246	L	.290	U	.368
E	.250	M	.295	V	.377
F	.257	N	.302	W	.386
G	.261	O	.316	X	.397
H	.266	P	.323	Y	.404
		Q	.332	Z	.413

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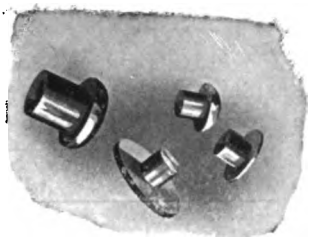

Iridio-Platinum Rivets and Wire

RIVETS for use as contact points in spark coils and other electrical apparatus requiring a non-oxidizing surface. Any styles made to order.
WIRE furnished in all sizes, cut to special length, etc.
We also make Jump Spark Platinum Wires and Platinum Ignition Tubes, and Platinum Work in all forms.

Greatest Output Guarantees Highest Quality at Lowest Prices

We will be pleased to supply full information and quote prices. Write to us.

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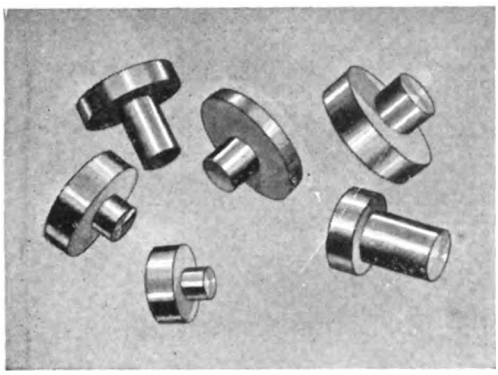
Hudson Terminal, 30 Church St.

BAKER & CO., Inc.
PLATINUM
NEWARK, N. J



PLATINUM

Platinum and Platinum-Iridium Rivets or contacts for Spark Coils and other electrical apparatus.

Made to any specifications and of any degree of hardness to meet all requirements

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Tell us the kind of battery you want to charge and we will quote on suitable apparatus.

THE CUTLER-HAMMER MFG. CO.
MILWAUKEE, WISCONSIN.

IGNITION BATTERY RHEOSTAT

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SIZES OF NUMBERS OF THE UNITED STATES STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL

An Act Establishing a Standard Gauge for Sheet and Plate Iron and Steel

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That for the purpose of securing uniformity the following is established as the only gauge for sheet and plate iron and steel in the United States of America, namely:

Number of Gauge	Approximate Thickness in Fractions of an Inch	Approximate Thickness in Decimal Parts of an Inch	Weight per Square Foot in Ounces Avoirdupois	Weight per Square Foot in Pounds Avoirdupois
0000000	1/2	.5	320	20.00
000000	15/32	.46875	300	18.75
00000	7/16	.4375	280	17.50
0000	13/32	.40625	260	16.25
000	3/8	.375	240	15.00
00	11/32	.34375	220	13.75
0	5/16	.3125	200	12.50
1	9/32	.28125	180	11.25
2	17/64	.265625	170	10.625
3	1/4	.25	160	10.00
4	15/64	.234375	150	9.375
5	7/32	.21875	140	8.75
6	13/64	.203125	130	8.125
7	3/16	.1875	120	7.5
8	11/64	.171875	110	6.875
9	5/32	.15625	100	6.25
10	9/64	.140625	90	5.625
11	1/8	.125	80	5.00
12	7/64	.109375	70	4.375
13	3/32	.09375	60	3.75
14	5/64	.078125	50	3.125
15	9/128	.0703125	45	2.8125
16	1/16	.0625	40	2.5
17	9/160	.05625	36	2.25
18	1/20	.05	32	2.
19	7/160	.04375	28	1.75
20	3/80	.0375	24	1.50
21	11/320	.034375	22	1.375
22	1/32	.03125	20	1.25
23	9/320	.028125	18	1.25
24	1/40	.025	16	1.
25	7/320	.021875	14	.875
26	3/160	.01875	12	.75
27	11/640	.0171875	11	.6875
28	1/64	.015625	10	.625
29	9/640	.0140625	9	.5625
30	1/80	.0125	8	.5
31	7/640	.0109375	7	.4375
32	13/1280	.01015625	6 1/2	.40625
33	3/320	.009375	6	.375
34	11/1280	.00859375	5 1/2	.34375
35	5/640	.0078125	5	.3125
36	9/1280	.00703125	4 1/2	.28125
37	17/2560	.006640625	4 1/4	.265625
38	1/160	.00625	4	.25

And on and after July first, eighteen hundred and ninety-three, the same and no other shall be used in determining duties and taxes levied by the United States of America on sheet and plate iron and steel. But this act shall not be construed to increase duties upon any articles which may be imported.

Sec. 3.—That in the practical use and application of the standard gauge hereby established a variation of two and one-half per cent. either way may be allowed.

Approved March 3, 1893.

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at a

Lower Manufacturing Cost are made possible with

ALUMALOYD SHEETS

For Bodies, Hoods, Guards, Drip Pans, etc.

The smooth, satiny surface, free from pits and scale marks, take a fine permanent finish at a very low cost.

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CANTON, OHIO

Onondaga Brass Co.

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Only the Highest Grade Material

Send Samples or Blue Prints for Quotation

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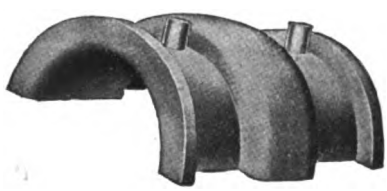
Manufacturers of

WOOD SCREWS
and
MACHINE SCREWS

of Iron, Brass and Bronze Metal, With Flat, Round and Oval Heads

RIVETS AND BURRS, STOVE BOLTS AND TIRE BOLTS

Mogul Die Castings



These are "finished" Castings, and require no machining.

Our customers of three years ago are our customers to-day, which proves conclusively that *Mogul Die Castings satisfy.*

Owning and operating our own Babbitt Metal Plant, Die Shop and Casting Plant, our Die Cast Bearings are entirely under our supervision from the time the alloy is made until they are finished ready to place in use.

We shall be pleased to receive your blue prints for estimates.

THE MUZZY-LYON CO., Ltd.

Owners and Operators of
MOGUL METAL COMPANY
DETROIT, MICH.

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WEIGHTS OF METALS

	Lbs. per Cu. Ft.	Lbs. per Cu. In.
Aluminum, cast	160	.0926
Brass, cast	506.3	.293
Brass, sheet	528	.3056
Babbitt metal	440.6	.255
Bronze, aluminum	471.2	.2727
Bronze, phosphor	575.8	.3332
Copper wire	555.1	.3212
Cast iron	450.	.2604
Wrought iron, bars	486.8	.2817
Steel, Bessemer	490.7	.284
Lead, cast	709.5	.4106
Nickel	548.7	.3175
Tin	458.3	.2652
Zinc	436.5	.2526

PROPORTIONATE WEIGHT OF CASTINGS TO WEIGHT OF WOOD PATTERNS

A Pattern Weighing One Pound, Made of (Less Weight of Core Prints)	Cast Iron	Brass	Copper	Bronze	Bell Metal	Zinc
Pine or Fir	16	15.8	16.7	16.3	17.1	13.5
Oak	9	10.1	10.4	10.3	10.9	8.6
Beech	9.7	10.9	11.4	11.3	11.9	9.1
Linden	13.4	15.1	16.7	15.5	16.3	12.9
Pear	10.2	11.5	11.9	11.8	12.4	9.8
Birch	10.6	11.9	12.3	12.2	12.9	10.2
Alder	12.8	14.3	14.9	14.7	15.5	12.2
Mahogany	11.7	13.2	13.7	13.5	14.2	11.2
Brass	0.85	0.95	0.99	0.98	1.0	0.81

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Detroit Gear & Machine Co.

127-151 Franklin Street, Detroit, Mich.

¶ New buildings and equipment enable us to take additional contracts for 200,000 hours' work.

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MANGANESE BRONZE, PHOSPHOR BRONZE

AND BRASS CASTINGS

Send us your Patterns for sample castings

CITY BRASS FOUNDRY CO., Cleveland, O.

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WEIGHT IN POUNDS OF A LINEAL FOOT OF ROUND, SQUARE AND OCTAGON STEEL

Size in Inches	Round	Octagon	Square	Size in Inches	Round	Octagon	Square
1/16	.010	.011	.013	2 1/2	16.79	17.71	21.37
1/8	.042	.044	.053	2 5/8	18.51	19.52	23.56
3/16	.094	.099	.120	2 3/4	20.31	21.42	25.86
1/4	.168	.177	.214	2 7/8	22.20	23.41	28.27
5/16	.262	.277	.334	3	24.17	25.50	30.78
3/8	.378	.398	.491	3 1/8	26.23	27.66	33.40
7/16	.514	.542	.655	3 1/4	28.37	29.92	36.12
1/2	.671	.708	.855	3 3/8	30.59	32.27	38.95
9/16	.850	.896	1.082	3 1/2	32.90	34.70	41.89
5/8	1.049	1.107	1.336	3 5/8	35.29	37.23	44.94
11/16	1.270	1.339	1.616	3 3/4	37.77	39.84	48.09
3/4	1.511	1.594	1.924	3 7/8	40.33	42.54	51.35
13/16	1.773	1.870	2.258	4	42.97	45.33	54.72
7/8	2.056	2.169	2.618	4 1/4	48.51	51.17	61.77
15/16	2.361	2.490	3.006	4 1/2	54.39	57.37	69.25
.	2.686	2.833	3.420	4 3/4	60.60	63.92	77.16
1 1/8	3.399	3.585	4.328	5	67.15	70.83	85.50
1 1/4	4.197	4.427	5.344	5 1/4	74.03	78.08	94.26
1 3/8	5.078	5.356	6.466	5 1/2	81.25	85.70	103.45
1 1/2	6.044	6.374	7.695	5 3/4	88.80	93.67	113.07
1 5/8	7.093	7.481	9.031	6	96.69	101.99	123.12
1 3/4	8.226	8.674	10.474	7	131.61	138.82	167.58
1 7/8	9.443	9.960	12.023	8	171.90	181.32	218.88
2	10.744	11.332	13.680	9	217.57	229.48	277.02
2 1/8	12.129	12.793	15.443	10	268.60	283.31	342.00
2 1/4	13.598	14.343	17.314	11	325.01	342.80	413.82
2 3/8	15.151	15.981	19.291	12	386.79	407.97	492.48

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Special Steel
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Automobile Work

Bars, Sheets and Shapes
Alumaloyd Sheets
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Tool Steel Forgings.

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Makers of Bright Cold Finished Steel; Rounds, Flats, Squares, Hexagons, and Special Shapes, for shafting, machine construction, etc. Cold Drawn Bright Free Cutting Screw Steel, Brand AA1, for rapid machining in hand and automatic screw machines. Cone Steel, Axle Steel, Crucible and Open Hearth Nickel Steel, Chrome Vanadium Steel for automobile and bicycle parts, axles, etc.

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FOR ALL PURPOSES

CHISELS, RIVET SETS, PUNCHES, PNEUMATIC PISTONS, DIES, GEARS, SPRINGS, CUTLERY, BOLT HEADING DIES, ETC.

Efficient in Service where Shock Strain and Vibration are constant

Manufactured by
VANADIUM-ALLOYS STEEL CO.
Latrobe, Pa.

SALES AGENT
W. C. ROYCE
225 ROCKEFELLER BUILDING
Cleveland, Ohio

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WEIGHT OF STEEL PER LINEAL FOOT

FLAT SIZES

	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2	2¼	2½	2¾	3	3½	4	5	6	7
⅛	.213	.266	.320	.372	.426	.479	.530	.585	.640	.745	.850	.955	1.07	1.18	1.28	1.49	1.70	2.13	2.56	2.98
3/16	.319	.399	.480	.558	.639	.718	.790	.878	.960	1.12	1.28	1.43	1.60	1.76	1.92	2.24	2.55	3.20	3.83	4.47
¼	.425	.533	.640	.743	.852	.958	1.06	1.17	1.28	1.49	1.70	1.91	2.13	2.34	2.56	2.98	3.40	4.26	5.11	5.96
5/16	.531	.665	.800	.929	1.06	1.20	1.33	1.46	1.60	1.86	2.13	2.39	2.66	2.92	3.19	3.72	4.25	5.32	6.38	7.44
⅜	.638	.798	.960	1.12	1.28	1.43	1.59	1.75	1.91	2.23	2.55	2.87	3.20	3.51	3.83	4.46	5.10	6.40	7.66	8.92
7/16	.744	.931	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.60	2.98	3.35	3.72	4.09	4.46	5.21	5.95	7.44	8.92	10.40
½	.....	1.07	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.98	3.40	3.83	4.26	4.68	5.10	5.96	6.80	8.52	10.20	11.90
9/16	.....	1.20	1.44	1.67	1.91	2.15	2.39	2.63	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.69	7.65	9.56	11.50	13.40
⅝	.....	.....	1.60	1.86	2.12	2.39	2.66	2.92	3.19	3.72	4.26	4.79	5.32	5.86	6.39	7.44	8.52	10.64	12.78	14.90
11/16	.....	.....	1.76	2.04	2.34	2.63	2.92	3.22	3.51	4.09	4.68	5.26	5.84	6.43	7.01	8.18	9.35	11.70	14.00	16.40
¾	.....	.....	.....	2.23	2.55	2.86	3.19	3.50	3.83	4.46	5.10	5.74	6.40	7.02	7.65	8.92	10.20	12.80	15.30	17.90
13/16	.....	.....	.....	2.41	2.76	3.11	3.45	3.80	4.14	4.83	5.53	6.22	6.91	7.60	8.29	9.67	11.10	13.80	16.60	19.30
⅞	.....	.....	.....	.....	2.98	3.34	3.72	4.09	4.46	5.21	5.96	6.70	7.46	8.19	8.94	10.42	11.92	14.87	17.88	20.80
15/16	.....	.....	.....	.....	3.19	3.59	3.98	4.38	4.78	5.58	6.38	7.17	7.97	8.77	9.56	11.20	12.80	15.90	19.10	22.40
1	.....	.....	.....	.....	.....	3.82	4.25	4.68	5.10	5.96	6.80	7.66	8.52	9.36	10.20	11.92	13.60	17.04	20.40	23.80
1⅛	.....	.....	.....	.....	.....	.....	4.78	5.27	5.74	6.71	7.65	8.61	9.59	10.54	11.48	13.41	15.30	19.17	22.95	26.80
1¼	.....	.....	.....	.....	.....	.....	.....	5.85	6.38	7.45	8.50	9.57	10.65	11.71	12.76	14.90	17.00	21.30	25.61	29.76
1½	.....	.....	.....	.....	.....	.....	.....	7.02	7.67	8.94	10.20	11.49	12.78	14.04	15.30	17.88	20.40	25.56	30.60	35.70

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E | To The Dealer: | B

—OUR LINE OF—

STEERING WHEELS
DASH BOARDS
FILLER BOARDS
WOOD TOOL BOXES, ETC.

is made from the choicest of materials and with utmost care in workmanship. Every product is up to present minute practice and our facilities are such as to afford prompt deliveries and to quote very interesting prices. The least you can do is to afford us an opportunity to demonstrate what we claim to be the best line ever put out. This information costs you the trouble of asking for it and should be the means to an economic end in securing supplies of this kind.

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Brass Castings, Composition, Aluminum, Phosphor Bronze, Parson's Manganese, Automobile Auxiliary Revolving Seats.

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Special Tools

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Let us assist you in this annoying and particular part of the manufacturing business.

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WEIGHT IN POUNDS OF SHEET AND BAR ALUMINUM, BRASS AND STEEL

Thickness or Diam. in Inch		Sheets per Square Foot			Square Bars, One Foot Long			Round Bars, One Foot Long		
Fraction	Dec.	Alum.	Brass	Steel	Alum.	Brass	Steel	Alum.	Brass	Steel
1/16	.0625	.869	2.77	2.52	.004	.014	.013	.003	.011	.010
1/8	.125	1.739	5.55	5.10	.018	.057	.053	.014	.047	.042
3/16	.1875	2.609	8.32	7.65	.041	.131	.119	.032	.102	.094
1/4	.2500	3.479	11.10	10.20	.072	.230	.212	.057	.182	.167
5/16	.3125	4.348	13.87	12.75	.114	.380	.333	.089	.284	.261
3/8	.3750	5.218	16.64	15.30	.163	.520	.478	.128	.408	.375
7/16	.4375	6.088	19.42	17.85	.222	.708	.651	.174	.555	.511
1/2	.5000	6.958	22.20	20.40	.290	.925	.850	.227	.724	.667
9/16	.5625	7.827	24.97	22.95	.367	1.171	1.076	.288	.919	.845
5/8	.6250	8.697	27.74	25.50	.453	1.445	1.328	.356	1.136	1.043
11/16	.6875	9.567	30.52	28.05	.548	1.748	1.608	.430	1.372	1.262
3/4	.7500	10.436	33.29	30.60	.652	2.080	1.913	.516	1.646	1.502
13/16	.8125	11.306	36.07	33.15	.766	2.445	2.245	.601	1.917	1.763
7/8	.8750	12.175	38.84	35.70	.888	2.833	2.603	.697	2.223	2.044
15/16	.9375	13.045	41.61	38.25	1.019	3.251	2.989	.800	2.552	2.347
1	1.0000	13.915	44.39	40.80	1.159	3.697	3.400	.911	2.906	2.670
1 1/16	1.0625	14.784	47.16	43.35	1.309	4.176	3.838	1.028	3.279	3.014
1 1/8	1.125	15.654	49.94	45.90	1.467	4.630	4.303	1.152	3.675	3.379
1 3/16	1.1875	16.524	52.71	48.45	1.635	5.216	4.795	1.284	4.096	3.766
1 1/4	1.2500	17.394	55.48	51.00	1.812	5.780	5.312	1.423	4.539	4.173
1 5/16	1.3125	18.263	58.26	53.55	1.997	6.370	5.857	1.569	5.003	4.600
1 3/8	1.3750	19.133	61.04	56.10	2.192	6.692	6.428	1.722	5.491	5.049
1 7/16	1.4375	20.002	63.81	58.65	2.396	7.644	7.026	1.882	6.002	5.518
1 1/2	1.5000	20.872	66.58	61.20	2.609	8.322	7.650	2.049	6.536	6.008
1 9/16	1.5625	21.741	69.35	63.75	2.831	9.030	8.301	2.223	7.091	6.520
1 5/8	1.6250	22.611	72.13	66.30	3.062	9.768	8.978	2.405	7.672	7.051
1 11/16	1.6875	23.481	74.90	68.85	3.302	10.53	9.682	2.593	8.271	7.604
1 3/4	1.7500	24.350	77.67	71.40	3.550	11.32	10.41	2.789	8.896	8.178
1 13/16	1.8125	25.250	80.54	73.95	3.810	12.15	11.17	2.992	9.544	8.773
1 7/8	1.8750	26.090	83.22	76.50	4.075	13.00	11.95	3.202	10.21	9.388
1 15/16	1.9375	26.960	86.00	79.05	4.352	13.88	12.76	3.417	10.90	10.02
2	2.0000	27.829	88.77	81.60	4.638	14.79	13.60	3.642	11.62	10.68

WEIGHT OF ALUMINUM, IRON, COPPER, BRASS AND LEAD BALLS

Dia. In.	Alum., Lbs.	Iron, Lbs.	Copper, Lbs.	Brass, Lbs.	Lead, Lbs.	Dia., In.	Alum, Lbs.	Iron, Lbs.	Copper Lbs.	Brass, Lbs.	Lead Lbs.
1	.045	.136	.166	.158	.214	7	15.58	46.76	57.1	54.5	73.7
1½	.153	.46	.562	.537	.727	7½	19.17	57.52	70.0	67.11	90.0
2	.363	1.09	1.3	1.25	1.7	8	23.27	69.81	85.2	81.4	110.1
2½	.710	2.13	2.60	2.50	3.35	8½	27.91	83.73	102.3	100.0	132.3
3	1.22	3.68	4.5	4.3	5.8	9	33.10	99.4	121.3	115.9	156.7
3½	1.94	5.84	7.14	6.82	9.23	9½	38.90	116.9	143.0	136.4	184.7
4	2.90	8.72	10.7	10.2	13.8	10	45.45	136.35	166.4	159.0	215.0
4½	3.13	12.42	15.25	14.5	19.6	10½	52.60	157.84	193.0	184.0	250.0
5	5.68	17.04	20.8	19.9	26.9	11	60.49	181.48	221.8	211.8	286.7
5½	7.56	22.68	27.74	26.47	36.0	11½	69.12	207.37	253.5	242.0	327.7
6	9.81	29.45	35.9	34.3	46.4	12	78.54	235.62	288.1	275.0	372.3
6½	12.48	37.44	45.76	43.67	59.13						

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ATLAS BALLS

STEEL, BRASS, BRONZE, CAST IRON

ATLAS STEEL BALLS are made from selected steel specially treated so as to give uniformity.

ATLAS BALLS are ground on the most modern improved machinery, thus insuring great accuracy in sphericity.

Send for Booklet and Prices.

ATLAS BALL COMPANY

Merchantville **NEW JERSEY**

Bow Sockets— The Ashtabula Kind

Patent Jan. 21, 1908.

For Automobiles are of established reputation, unequalled for strength, style, symmetry and proportion. Our Automobile Sockets are made with double tube construction throughout.

We also make Automobile Gooseneck and Top Rest Irons that like our Bow Sockets, are unequalled.

Write for Catalog.

Patent Jan. 21, 1908.

The Ashtabula Bow Socket Company

Ashtabula, Ohio

The oldest makers of Bow Sockets in the world.

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EFFECT OF HEAT ON TENSILE STRENGTH AND EXPANSION OF PURE ALUMINUM

SHRINKAGE OF ALUMINUM CASTINGS

Temperature Fahrenheit	Tensile Strength Tons per Square Inch	Expansion in Volume
58°	11.7	.000884
212°	9.5	.006120
302°	8.1	.009180
392°	6.3	.012240
482°	4.8	.015300
572°	3.6	.018360
752°	2.4	.024480
842°	1.5	.027540
860°	1.0	.028152

Shrinkage in aluminum castings is about 17-64th inch per foot.

RESULTS OF TESTS OF PARSONS' MANGANESE BRONZE (CONDUCTED BY R. W. HUNT & CO.)

TENSION TESTS

Kind of Metal	Rolled		Cast	
Length, test section	2.00	2.00	2.00	2.00
Original diameter	.499	.50	.505	.505
Original area	.1956	.1963	.200	.200
Reduced diameter	.387	.372	.390	.395
Reduced area	.1176	.1087	.1194	.1225
Elongation in 2 in	.58	.70	.72	69
Elastic limit, lbs	9,740	9,900	9,230	8,950
Maximum load, lbs	13,970	13,970	17,600	16,950
Elastic limit, lbs. per sq. in	49,790	50,430	46,150	43,250
Maximum load	71,420	71,160	78,000	74,750
Reduction of area, per cent	39.8	44.6	40.3	38.7
Elongation, per cent	29	35	36	34.5
Fracture	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular

COMPRESSION TESTS

Kind of Metal	Rolled	
Length of test piece	2.00	2.00
Diameter of test piece	1.03	1.02
Area of test piece	.790	.7886
Total compression	.584	.629
Approximate elastic limit	52,500	52,500
Maximum load, lbs	113,500	116,300
Approximate elastic limit, lbs. per sq. in	66,460	66,570
Maximum load, lbs. per sq. in	143,770	147,500
Failed by	Shear angle with vertical 36 deg.	Shear angle with vertical 33 deg.
Fracture	Silky	Silky

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Buying castings without a reputation is like spinning a coin on results, a hit or miss proposition—"heads, he wins—tails you lose." You can't see the quality of material and casting with the eye, so you don't know what you've got until you test them.

"AUTOMOBILE" BRAND

ALUMINUM CASTINGS

need small comment as far as reputation for quality, service, dependability and economy goes.

These castings are used by the leading and largest automobile makers because of their

HIGH GRADE QUALITY
LIGHTNESS AND STRENGTH

giving maximum strength with minimum weight, and in every way meeting the most exacting requirements.

Especial adaptation to automobile construction.

If you want to make sure of the Best send us your pattern for a sample.

WE ALSO MAKE

"AUTOMOBILE" Brand PLASTIC BRONZE and MANGANESE CASTINGS

UP TO DATE—UP TO THE MINUTE. LET US SUBMIT SAMPLES.

LIGHT MFG. & FOUNDRY CO.

POTTSTOWN, PA.

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STRENGTH OF AUTOMOBILE MATERIALS

	Modulus of Rigidity	Elastic Limit	Tensile Strength
Aluminum alloys	8 to 11 million	10 M to 15 M	20 M to 30 M
Phosphor bronze	12 to 14 "	20,000	30,000
Manganese bronze	15 "	35,000	50,000
Aluminum bronze	15 "	50,000	75,000
Wrought iron	28 "	30,000	40,000
Mild open hearth steel	28 "	40,000	60,000
Tool steel	29 "	80,000	110,000
Nickel steel	28 "	80,000	110,000
Nickel chrome steel	30 "	160,000	180,000
Vanadium steel treated	30 "	220,000	228,000

All of the above materials stand well under dynamic stress with the exception of the tool steel, which should not be used for this purpose.

TEST OF HIGH QUALITY NICKEL CHROME STEEL (KRUPP)

DIMENSIONS OF TEST BARS, 5.91 INS. LONG AND 0.59 INS. DIAMETER

	Normal	Slightly Hardened	Greater Degree of Hardness
Elastic limit, pounds per square inch	86,909	148,072	193,589
Tensile strength, pounds per square inch	111,943	155,326	221,325
Elongation, per cent	14.5	9.1	7.7
Contraction, per cent	64.0	55.6	46.2

Foregoing tests assume correct heat treatment.

MELTING POINTS OF METALS

Cast iron	2210	deg	Fahr.
Wrought iron	2912	"	"
Steel	2500	"	"
Copper	2160	"	"
Brass	1900	"	"
Aluminum (pure)	1112	"	"
Lead	608	"	"
Tin	446	"	"

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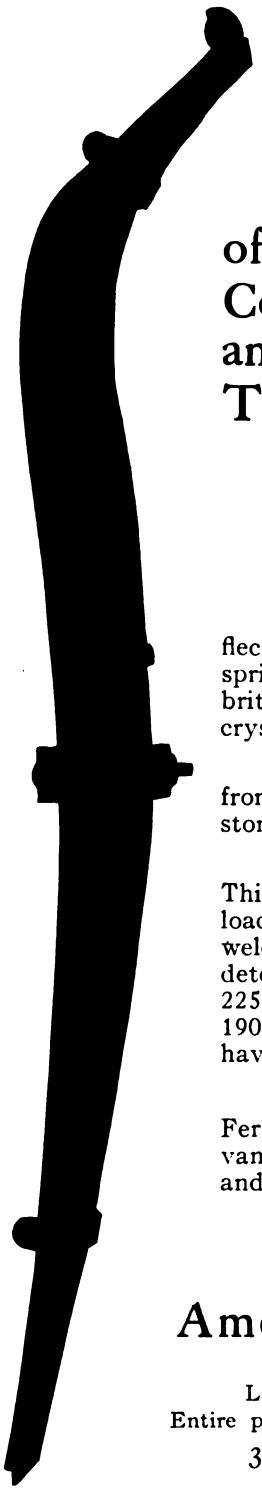

THE CHICAGO Branch Manager

of one of the largest Automobile Companies visited his factory and saw some springs tested. This is his letter:

"I saw springs such as are used in some automobiles of high class lose permanently one inch of their height under a movement of seven inches, while our *Chrome Vanadium Springs under a movement of nine inches did not lose a particle of elasticity and came back to their original form.*"

Chrome Vanadium Steel Springs stand more deflection without permanent set than any other type of spring known. Furthermore, Vanadium Steel is not brittle and has unusual dynamic qualities; it will not crystallize and therefore resists fatigue.

The engraving shows this quality in a spring taken from a car that was totally wrecked by running into a stone wall.

Specify Type "D" Vanadium Steel for Springs. This type has double the co-efficient of safe working load compared with carbon spring steel; it is easily welded and can be repeatedly over-loaded without deterioration; it has an elastic limit of from 180,000 to 225,000 lbs. per square inch, with tensile strength from 190,000 to 250,000 lbs. Spring makers guarantee it to have three times the life of Carbon Steel Springs.

Be sure to specify springs made from "Amervan" Ferro Vanadium, which is the only standard. "Amervan" Ferro Vanadium is guaranteed free from impurities and correct in every particular.

Write for booklet on Type "D."

American Vanadium Company

Miners of Vanadium Ores
Largest producers of Vanadium alloys in the World
Entire product sold by the Vanadium Sales Co. of America.
336 Frick Building, Pittsburgh, Pa.

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MALLEABLE IRON TESTS

Results of Test of Sample Malleable Iron Bar made for the Ohio Malleable Iron Company, Columbus, O.

Test No.	Test made by	Elastic Limit Lbs. per sq. in.	Tensile Strength Lbs. per sq. in.	Elongation per cent.	Reduction of Area per cent
58491	The Detroit Testing Laboratory.	37195	53283	15.62	21.38
32504	Pittsburg Testing Laboratory	34750	54340	18.00	21.1
[illegible]	Robert W. Hunt & Co.....	41195	52940	17.00	25.63

SPECIFICATIONS FOR CAST IRON PARTS (GERMAN).

(*Translated from "Metall Technick"*)

Specifications for cast-iron parts have only of relatively recent date been subjected to regulations of recognized value, and this has been one of the reasons for discrediting castings as parts in automobile construction, their strength being difficult to determine in advance. The reason why practice and science have refrained from formulating basic rules for deciding the strength and properties of cast-iron parts, even though foundry science has progressed by leaps and bounds, is to be sought in the fact that the unit strength of a casting, even in the case of comparison between materials derived from the same ladle, depends largely upon the dimensions of the piece and the more or less rapid cooling to which it has been subjected. The same difference arises with regard to a single cast piece, according to the direction and location of the stress. The strength along one cross-section varies from the strength through another section, and the difference is not pro rata with the dimensions. Slow cooling, as where the diameter is greatest, produces a coarser structure and also causes carbon to be precipitated as graphite between the walls of adjacent crystals, greatly reducing strength. Flexion tests made by O. Leyde with bars of square section of different dimensions and all cast in one piece with a heavier bar uniting them across one end showed that the softest iron developed the most pronounced differences in unit strength, in favor of the bars of small section. A bar 10 by 10 millimeters in section endured a stress of 47 kilograms per square millimeter, while a bar of 150 by 150 millimeters cross-section endured only 18 kilograms per square millimeter. In three series of tests the materials differed mainly in silicon, this metalloid running from 2.1 per cent. in the hardest to 1.5 per cent. and 1.2 per cent. in the softer grades. The composition otherwise was carbon 3, phosphorus 0.6, manganese 0.7 and sulphur 0.12. Similar results were reached in tests by Sulzer Brothers of Winterthur with bars from 5 to 50 millimeters in diameter, giving a strength decreasing from 63 kilograms for a bar of 5 millimeters diameter to 27 kilograms for the largest size. The Society of German Iron Foundries has now created regulations for cast-iron tests in which the principal source of error in previous rules—the use of only a single dimension of bar—is eliminated. The new regulations distinguish between: A, machine castings of (1) medium, (2) high and (3) very high strength; B, architectural and construction castings and C, pipe castings, comprising (1) gas and water pipe and (2) steam pipe. Each subdivision is further divided according to dimensions of the casting in three classes: (1) Pieces with walls up to 15 millimeters thick; (2) between 15 and 25 millimeters, and (3) average wall thickness of more than 25 millimeters. Further regulations extend to shapes, properties of the material and method of producing test bars. In addition to flexion tests here is provided test by internal hydraulic pressure for tubular castings. The testing work which was called into action by these regulations at the various foundries has created a demand for a special machine for facilitating the measurements, and one such has been produced by the Düsseldorfer Machine Company, Inc., and is provided with automatic stress-measuring instrument and recording manometer giving direct reading in kilograms.

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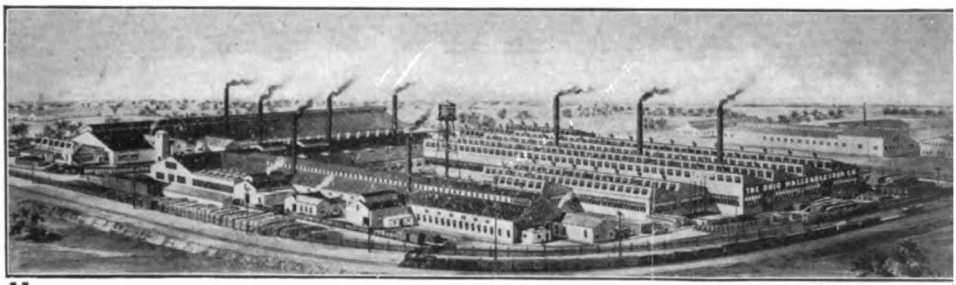

THE OHIO MALLEABLE IRON CO.

COLUMBUS, OHIO

ANNUAL CAPACITY 20,000 TONS

SPEAKING OF **QUALITY**

The Detroit Testing Laboratory in submitting report, January 23, 1911, on test bars which are regularly run from our heats, says:

> "We have no record of a malleable test bar which we have tested for Elastic Limit, Tensile Strength, Reduction in Area and Elongation that anywhere approaches the qualities found in the bar above referred to."

THEN AS TO **SERVICE**

You can have the same splendid service, the same thoroughgoing attention to detail—the quality—the finish—the service that has earned us the business of some of the largest buyers of malleable tonnage in the country—if you'll just say the word.

WHEN IT COMES TO **PRICE**

Large capacity and efficient organization tend to lower production costs—so it may pay you to let us get better acquainted. The cost of the best castings is not necessarily greater than that of mediocre work—IF you know how.

Don't let us talk to you—but send us your most difficult patterns to make castings for your inspection and test.

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EFFICIENCY TEST OF AUTOMOBILE RADIATOR (McCORD)

Height, 28.5″; Width, 25″; Thickness, 3.25″; Weight, 60 pounds. Made up of 144 Vertical Water Tubes ¼″ Diameter

Time in Mins.	R.P.M. of Motor	Pounds on Scale	Temperature F.				
			Water		Air		
			To Radiator	From Radiator	To Fan	From Fan	In Room
00	1000	20.00	160.00	152.00	90.25	95	86.0
05	1000	20.00	181.00	172.00	91.75	99	87.8
10	1000	19.75	189.00	180.00	91.75	100	88.5
15	1000	20.00	193.00	184.00	91.75	102	89.0
20	1000	19.75	195.00	185.00	91.75	109	89.6
25	1000	20.00	197.00	187.00	92.50	104	90.3
30	1000	20.00	198.00	188.00	92.50	104	90.3
35	1000	20.00	197.00	187.00	92.50	103	89.9
40	1000	20.00	197.00	187.00	95.50	103	90.1
45	1000	20.00	197.25	187.25	92.50	102	90.1
50	1000	20.00	197.00	187.25	92.50	102	89.6
55	1000	20.00	197.00	187.25	93.25	104	89.6
60	1000	20.00	197.00	187.00	91.75	102	90.5
65	1000	30.00	207.00	196.00	94.00	105	91.0
70	1000	30.00	211.00	201.50	96.25	107	92.5
71	1000	30.00	212.00	202.00	96.25	107	92.8

Note.—144 pounds of jacket water per minute.

The test as here given was made by an automobile builder. The table shows, among other points of interest, that it took 25 minutes before the water reached a constant temperature, after which the radiator abstracted 1,431.4 B.T.U. of heat from the jacket water, with a difference in the water between inlet and outlet of 9.94 degrees Fahrenheit, working between the limits of 197 and 187 degrees Fahrenheit. The amount of water circulated was (as given in the table) 144 pounds. Since the temperature did not reach the maximum allowable in practice (the boiling point of water) it is a fair inference that the capacity of this radiator can be taken as about equal to 1,500 B.T.U. (British thermal units of heat) under the conditions of this test, considering round numbers.

APPROXIMATE WOOD WHEEL DIAMETERS FOR VARIOUS SIZES AND TYPES OF RIMS

Size Tire	Clincher and Universal	Firestone Demountable	Fisk Bolted On	Fisk Demountable	Continental Demountable	Continental Demountable Metric Sizes
30 × 3½	22 11/16	21 11/16	21 13/16	19 3/16	22	.....
32 × 3½	24 11/16	23 11/16	23 13/16	21 3/16	24	810 × 90 – 23 3/16
34 × 3½	26 11/16	25 11/16	25 13/16	23 3/16	26	870 × 90 – 25 5/8
36 × 3½	28 11/16	27 11/16	27 13/16	.....	28	910 × 90 – 27 3/16
30 × 4	21 11/16	20 11/16	20 5/8	.....	21	.....
32 × 4	23 11/16	22 11/16	22 5/8	20	23	.....
34 × 4	25 11/16	24 11/16	24 5/8	22	25	875 × 105 – 25 5/8
36 × 4	27 11/16	26 11/16	26 5/8	24	27	915 × 105 – 27 3/16
32 × 4½	22 21/32	21 21/32	21½	.....	.....	820 × 120 – 21 17/64
34 × 4½	24 21/32	23 21/32	23½	20 13/16	23 59/64	880 × 120 – 23 47/64
36 × 4½	26 21/32	25 21/32	25½	22 13/16	25 59/64	920 × 120 – 25 3/16
34 × 5	23 21/32	22 21/32	.....	19 7/16	22 59/64	.....
36 × 5	25 21/32	24 21/32	.....	21 13/16	24 39/64	.....
36 × 5½	24 21/32	23 21/32	.....	.....	.....	935 × 135 – 24 3/64
37 × 5½	25 21/32	24 21/32	.....	.....	24 3/64	.....

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LONG MANUFACTURING Co

CHICAGO AND DETROIT

We make Three Distinct Types

LONG

WATCH THE "L" GROW

PATENTED

PATENTED

PATENTED

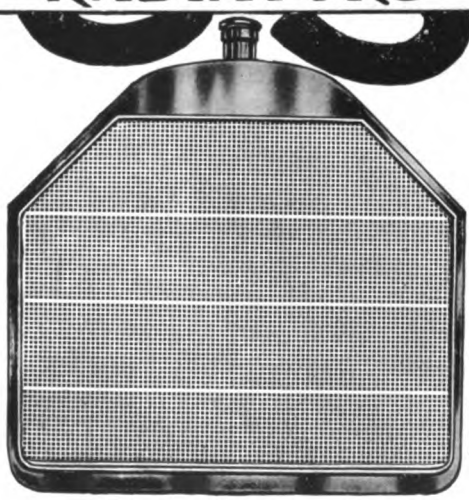
DISTANCE COOLERS

LONG'S RADIATORS are the most efficient in point of radiation, workmanship and appearance You can make no mistake in buying either of these types. For full descriptive nformation send for new catalogue.

Address: LONG MFG. CO., CHICAGO or DETROIT

BUSH

RADIATORS



HIGH GRADE

WE MAKE ALL KINDS OF SHEET METAL PARTS

Bush Manufacturing Co

HARTFORD, CONN.

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AUTOMOBILE WHEEL DATA

The following information is approximately correct, but the weights, etc., may vary according to the height of wheels, etc.:

WEIGHT OF WHEELS PER SET OF FOUR

Weight of wheels and hubs without rims or channels, size of spoke $\frac{7}{8}$ to 1″ or $1\frac{1}{8}$″, about	50	pounds
" same size with steel rims for $2\frac{1}{2}$″ or 3″ tire	110	"
" 1″ or $1\frac{1}{8}$″ spokes	65	"
" including rims for 3″ or $3\frac{1}{2}$″ tires	145	"
" $1\frac{1}{4}$″ or $1\frac{3}{8}$″ spokes	100	"
" including rims for $3\frac{1}{2}$″ or 4″ tire	210	"
" $1\frac{3}{8}$″ or $1\frac{1}{2}$″ spokes	112	"
" including rims for 4″ or $4\frac{1}{2}$″ tire	250	"

Axles are not included in above.

METRIC TIRES AND THEIR AMERICAN EQUIVALENTS

Metric Sizes	Approximate Size in Inches
650 x 65	26 x 2 1/2
700 x 65	28 x 2 1/2
750 x 65	30 x 2 1/2
800 x 65	32 x 2 1/2
830 x 65	33 x 2 1/2
860 x 65	34 x 2 1/2
700 x 85	28 x 3 1/4
750 x 85	30 x 3 1/4
800 x 85	32 x 3 1/4
860 x 85	34 x 3 1/4
760 x 90	30 x 3 1/2
810 x 90	32 x 3 1/2
840 x 90	32 x 3 1/2
870 x 90	34 x 3 1/2
910 x 90	36 x 3 1/2
960 x 90	38 x 3 1/2
1010 x 90	40 x 3 1/2
815 x 105	32 x 4
875 x 105	34 x 4
915 x 105	36 x 4
820 x 120	32 x 4 1/2-5
850 x 120	33 x 4 1/2-5
880 x 120	34 x 4 1/2-5
920 x 120	36 x 4 1/2-5
1020 x 120	40 x 4 1/2-5
1080 x 120	42 x 4 1/2-5

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Phineas Jones & Co.

Newark, New Jersey

Make the best Automobile wheels. Only one quality—the **best.**

Fifty years at vehicle wheel making.

CLINCHER RIMS CLINCHER RIMS

FOR

AUTOMOBILES

ALL OUR RIMS ARE WELDED BY ELECTRICITY

THE MOTT WHEEL WORKS

UTICA, N. Y., U. S. A.

Automobile Wheels

From 1-inch up to 3½-inch Spoke

WAYNE WHEEL CO.

Newark, New York State

AUTO WHEELS

MANUFACTURED BY

SHORTSVILLE WHEEL CO. **SHORTSVILLE, NEW YORK**

Write for prices

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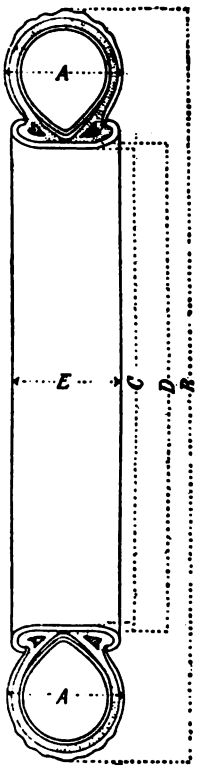
CLINCHER TIRE AND RIM DIMENSIONS



A	B	C	D	E
Inches	Inches	Inches	Inches	Inches
2 1/2	26	18 3/4	19	1 3/8
3	26	19 3/4	20	1 3/8
2 1/2 and 3	28	21 3/4	22	1 3/8
2 1/2 and 3	30	23 3/4	24	1 3/8
3	32	25 3/4	26	1 3/8
3	34	27 3/4	28	1 3/8
3	36	29 3/4	30	1 3/8
3 1/2	28	20 11/16	21	1 3/8
3 1/2	30	22 11/16	23	1 1/2
3 1/2	32	24 11/16	25	1 1/2
3 1/2	34	26 11/16	27	1 1/2
3 1/2	36	28 11/16	29	1 1/2
4	30	21 11/16	22	2
4	32	23 11/16	24	2
4	34	25 11/16	26	2
4	36	27 11/16	28	2
4 1/2	32	22 11/16	23	2 1/4
4 1/2	34	24 11/16	25	2 1/4
4 1/2	36	26 11/16	27	2 1/4

PROPORTIONS BETWEEN AXLE LOADS AND TIRE SIZES ADOPTED BY AMERICAN TIRE MAKERS

2 1/2-inch tires, all diameters	225	pounds per wheel
3 inch tires, all diameters	350	" " "
3 1/2 x 28-inch tires	400	" " "
3 1/2 x 30-inch tires	450	" " "
3 1/2 x 32-inch tires	555	" " "
3 1/2 x 34-inch tires	600	" " "
3 1/2 x 36-inch tires	600	" " "
4 x 30-inch tires	550	" " "
4 x 32-inch tires	650	" " "
4 x 34-inch tires	700	" " "
4 x 36-inch tires	750	" " "
4 1/2 x 32-inch tires	700	" " "
4 1/2 x 34-inch tires	800	" " "
4 1/2 x 36-inch tires	900	" " "

For weights in excess of 1,000 pounds per wheel, 5-inch tires and over are recommended. Weights given apply to car without passengers.

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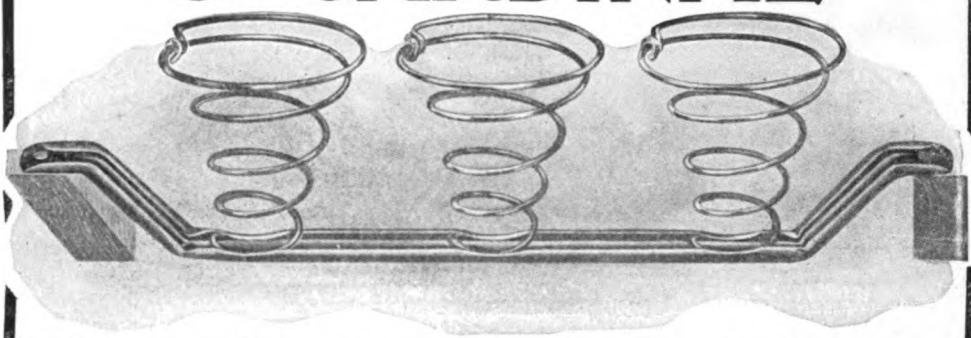
The CARDINAL



The Ideal Cushion and Seat Spring. Maximum Strength with Minimum Weight and Material. . . Perfect Construction.

ALL spirals in our spring work are made from the highest grade of spring wire, re-tempered, making it particularly strong and elastic. The spirals are firmly seated in a tempered steel arch with edges turned upward. They are absolutely noiseless, with greatest strength and durability. The very severest punishment the cushion may receive will not strain or injure it.

"The Cardinal" is shipped to you finished and ready for the frame—not more than thirty seconds required to spring the seat.

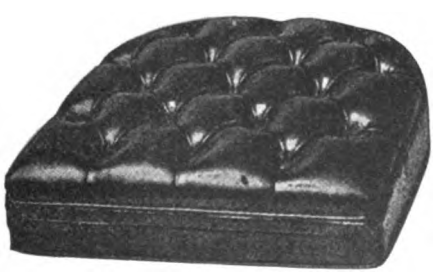
In your own interests, get full particulars and prices—it will pay you

BARBER MANUFACTURING COMPANY
ANDERSON, INDIANA, U. S. A.

LET US HELP YOU DO YOUR

UPHOLSTERING

¶ We guarantee with our devices to make your Backs and Cushions equal to the best hand work at less than one-half your present cost. Over 70 per cent. of the leading Automobile Manufacturers and Body Trimmers now use our devices. Let us figure with you. Ask for list of users.



OUR REFERENCE
15 years of practical experience and over 600 satisfied customers of which 80 are automobile builders and trimmers ∴ ∴ ∴ ∴ ∴ ∴ ∴ ∴

Novelty Tufting Machine Co.
1202 MICHIGAN AVENUE., CHICAGO, ILL.

This Cushion with soft facing made in less than 1 hour's time complete. Our demonstrators will teach your help to do this.

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AIR PRESSURES FOR INFLATING PNEUMATIC TIRES RECOMMENDED BY LEADING MAKERS

Diameter of Tire, Inches	Maximum Weight on Wheel, lbs.	Air Pressure in Tire, lbs. per Square Inch
2 1/2	225	50
3	350	60
3 1/2	600	70
4	750	80
4 1/2	1,000	90
5	1,000	90

INCREASE IN AIR PRESSURES CAUSED BY DRIVING

The figures given by tire manufacturers as the most suitable for initial inflation generally take into account the increase in temperature and pressure created by prolonged running. It, however, is useful to know what this increase is. The figures given in the following table are given by a French authority and are averages computed on tires from 3 to 4½ inches diameter under usual touring car weight and speed conditions. For larger tires the increase is greater on account of the greater rigidity of the cover walls, resulting in greater internal strains in the fabric at the points of bending.

Initial Pressure in Tire, Cold	Working Pressure in Tire, Warm	Increase Resulting from Work
Lbs per Sq. In.	*Lbs. per Sq. In.*	*Lbs. per Sq. In.*
71.116	88.183	17.067
85.339	105.750	20.411
99.562	123.546	23.984
113.785	141.920	28.135
128.008	158.588	30.580
142.232	176.368	34.136

CAUSES OF PNEUMATIC TIRE TROUBLES

The following tables were prepared by one of the largest tire makers as a result of investigations in several thousand repair jobs:

SHOES

17.3 per cent. in consequence of insufficient inflation.
3.5 per cent. in consequence of rusty and dented rims.
1.5 per cent. in consequence of cutting off of cover pad through inadequate fastening of butterfly screw, whereby the cover could shift on the rim.
1 8 per cent. in consequence of sudden braking, which scoured through tire at one place.
.2 per cent. in consequence of contact with oil or other fatty substances, which are known to decompose rubber.
29.4 per cent. in consequence of perforation by nails, stones and pieces of iron.
4.3 per cent. in consequence of light damages and cuts on the threads, easily repaired.
4.9 per cent. in consequence of considerable outer damages, whereby the upper canvas layers were destroyed.
37.1 per cent. in consequence of normal wear and tear.

100.0

TUBES

13.0 per cent. nipped in mounting.
7.2 per cent. places scoured through in consequence of defective mounting or the presence of sand and small stones in tire.
9.5 per cent. through defective mounting.
6.8 per cent. through riding on deflated tubes.
5.8 per cent. damages through defective and wrong cover holders.
10.0 per cent. valve defects through wrong manipulation of valve.
43.7 per cent. normal wear and tear

100.0

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F. L. HORTON MFG. CO. BOSTON

ELEKTRA

ASBESTOS FRICTION

For BRAKES and CLUTCHES

Over 1,000,000 feet of material produced by our PATENTED PROCESS in daily use.

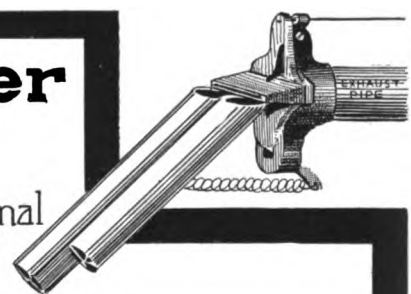
High co-efficient of friction gives greatest factor of safety in operation of all brakes and clutches and OUR PATENTED PROCESS produces the only HIGH-FRICTION facing.

THIS MATERIAL gives better satisfaction and wears longer than any other facing and is especially adapted for manufacturer's use; our BAND linings, as well as RINGS and CONES for CLUTCHES being formed ACCURATELY to shape and size.

F. L. HORTON MANUFACTURING CO.

45 MILK STREET, BOSTON, MASS.

The Best Seller In the Field



EXO "The Low Priced Signal With the High Priced Voice"

We want more dealers to sell this, the most powerful and durable low priced automobile signal and the most popular.

EXO is well advertised and the demand for it is great. Its retail prices—$5 for all sizes, 30 horsepower and under, and $7 for all sizes over 30 horsepower—are most attractive; in fact, you will make no mistake in taking on these signals and pushing them.

EXO operates from the exhaust of the engine; can be heard a mile; can never wear out; is easily installed.

EXO finds instant favor with those who have cars equipped with bulb horns only.

Send your trial order, demonstrate the signal and take the orders. Act promptly. We guarantee satisfaction or refund money.

Troy Auto Specialty Co., Troy, N. Y.

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FORMULA FOR DETERMINING DIAMETERS OF SPROCKETS FOR ROLLER CHAINS (WHITNEY MFG. CO.)

N = Number of teeth in sprocket.
P = Pitch of chain.
D = Diameter of roller.

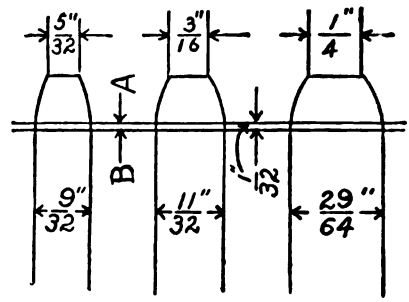
$$a = \frac{180^\circ}{N}$$

$$\text{Pitch Diameter} = \frac{P}{\sin a}$$

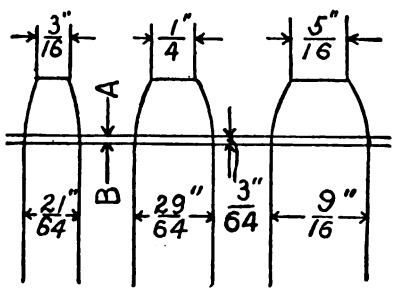
Outside Diameter = Pitch Diameter + D.
Bottom Diameter = Pitch Diameter − D.

The accompanying drawings show width and shape of sprocket blanks as they should be machined before cutting the teeth to fit (Whitney) chains.

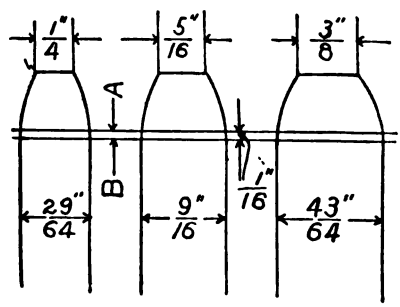
The line "A" indicates pitch line and the line "B" below the pitch line indicates the point at which the clearance curves should start.



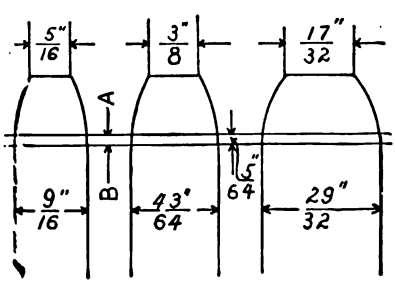
	Pitch of Chain.	
3/4"	3/4"	3/4"
	Diameter of Roll.	
15/32"	15/32"	15/32"
	Width of Roll.	
5/16"	3/8"	1/2"



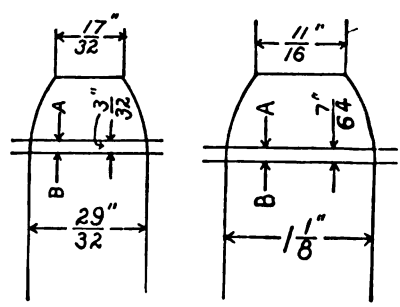
	Pitch of Chain.	
1"	1"	1"
	Diameter of Roll.	
5/8"	5/8"	5/8"
	Width of Roll.	
3/8"	1/2"	5/8"



	Pitch of Chain.	
1 1/4"	1 1/4"	1 1/4"
	Diameter of Roll	
3/4"	3/4"	3/4"
	Width of Roll.	
1/2"	5/8"	3/4"



	Pitch of Chain.	
1 1/2"	1 1/2"	1 1/2"
	Diameter of Roll.	
7/8"	7/8"	7/8"
	Width of Roll.	
5/8"	3/4"	1"



	Pitch of Chain.	
1 3/4"		2"
	Diameter of Roll.	
1"		1 1/8"
	Width of Roll.	
1"		1 1/4

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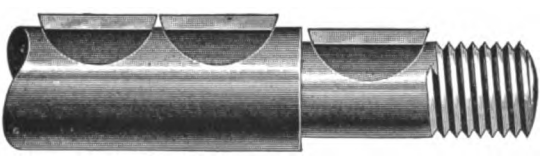
Whitney Chains
Are Built for Strains

The leading trucks are equipped with Whitney Chains because chains must be accurate and dependable. Whitney Chains are both. When making replacements try a Whitney Chain and be convinced.

MACHINE DEPARTMENT

Whitney Hand Millers
20-Inch Water Tool Grinders
Presto Drill Chucks
Arbors, Collets, Friction Tapping Devices
and
"The Woodruff Patent System of Keying"



The WHITNEY MFG. CO., Hartford, Conn.

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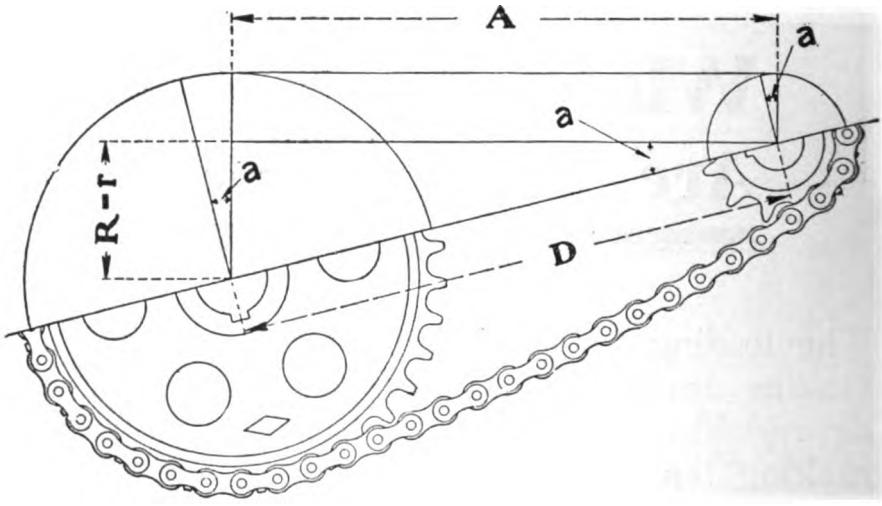
FORMULA FOR CALCULATING LENGTH OF CHAIN

(DIAMOND CHAIN AND MFG. CO.)



(All Dimensions in Inches)

D = Distance between centers.
A = Distance between limits of contact.
R = Pitch radius of large sprocket.
r = Pitch radius of small sprocket.
N = No. of teeth on large sprocket.
n = No. of teeth on small sprocket.
P = Pitch of chain and sprockets.
$180° + 2\alpha$ = Angle of contact—small sprocket.
$180° - 2\alpha$ = Angle of contact—small sprocket.

$$\text{Sin } \alpha = \frac{R - r}{D}$$

$$A = D \cos \alpha$$

Length of chain $= L$

$$L = \frac{(90 + \alpha)\, N P}{180} + \frac{(90 - \alpha)\, n P}{180} + 2 D \cos \alpha$$

Index to Tables and Data appears on Pages 23 to 25.

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1911 "DART" 1911

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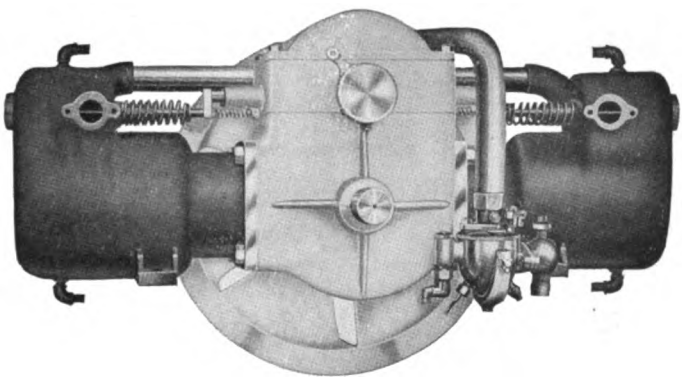
Multiple Disc Type for Trucks

EIGHTEEN YEARS OF HONEST PRODUCTION. MOST SCIENTIFIC ENGINES ON THE MARKET. POWER IS THE DEMAND—PERFECTION—ABSOLUTE RELIABILITY.



Valves can be ground in two minutes. Large bearings, scientifically balanced.

Perfect lubrication. **LARGE Water Jackets** for long, hard truck service.

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"DART" MODEL F—4¾" x 5". 18-20 H. P. AIR COOLED.
"DART" MODEL E—4¼" x 5". 14-16 H. P. WATER COOLED.
"DART" MODEL D—4¼" x 5". 12-14 H. P. AIR COOLED.
"DART" MODEL G—4 1/16" x 4". 10-12 H. P. AIR COOLED.

Planetary Transmissions to Couple Any of These Motors.

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AGENTS WRITE TODAY.

This is a car of compact simplicity that a boy can run and understand.

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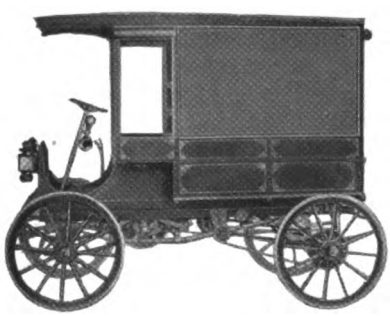

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Open Jobs
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Write today for free catalog of complete line.

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ANTI-FREEZING SOLUTIONS FOR MOTOR COOLING SYSTEMS

Saline solutions and mixtures of alcohol and water are the most commonly used to prevent freezing up of the cooling system in water-cooled motor vehicles when operated in low winter temperatures. Of the former, that in best repute is a solution of calcium chloride. Crystallized calcium chloride contains about 50 per cent. water of crystallization and dissolves in half its weight of cold water; consequently 8 pounds of calcium chloride dissolved in ½ gallon of water will make 1 gallon of saturated solution. The accompanying table (Fig. 1) shows the percentages of calcium chloride and corresponding specific gravity required to prevent freezing at temperature ranges from freezing point to −40 degrees Fahrenheit. In the use of this solution its thermal capacity, which is lower than water, should be borne in mind.

Taking the specific heat of water as 1.000, the specific heat of a 20 per cent. solution of calcium chloride is 0.834.

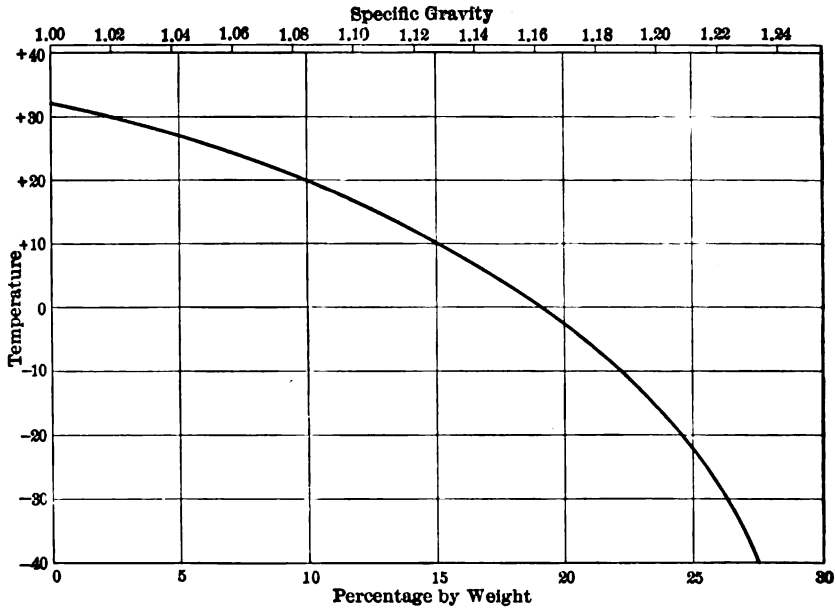

FIG. 1.—Diagram of Freezing Points of Various Solutions of Calcium Chloride in Water.

Mixtures of alcohol and water may be made with either wood alcohol or denatured alcohol. The latter is simply ordinary spirits distilled from grain with an admixture of certain substances that render it unfit for drinking and which may be disregarded in its consideration as a cooling medium. In the accompanying table (Fig. 2) the respective anti-freezing values for wood alcohol and denatured alcohol are given in terms of percentages of the liquid used in the motor-cooling system. These values cover a temperature range from freezing point to −50 degrees Fahrenheit. The specific gravity readings are also included. It will be noted that wood alcohol gives the best results, although objection is frequently made to its use on account of its unpleasant odor.

(Continued on page 710)

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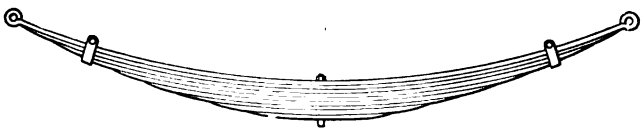

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and
CARBON STEELS

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In the use of this mixture the constant tendency of the alcohol to evaporate out and the consequent raising of the freezing point of the mixture should be borne in mind. At any time after the filling of the cooling system with the mixture, a sample can be drawn off and its specific gravity determined by the use of the hydrometer. If the reading is too high, sufficient alcohol can be added to make up for loss by evaporation, taking care, of course, that the amount of water in the system has not been diminished by steaming.

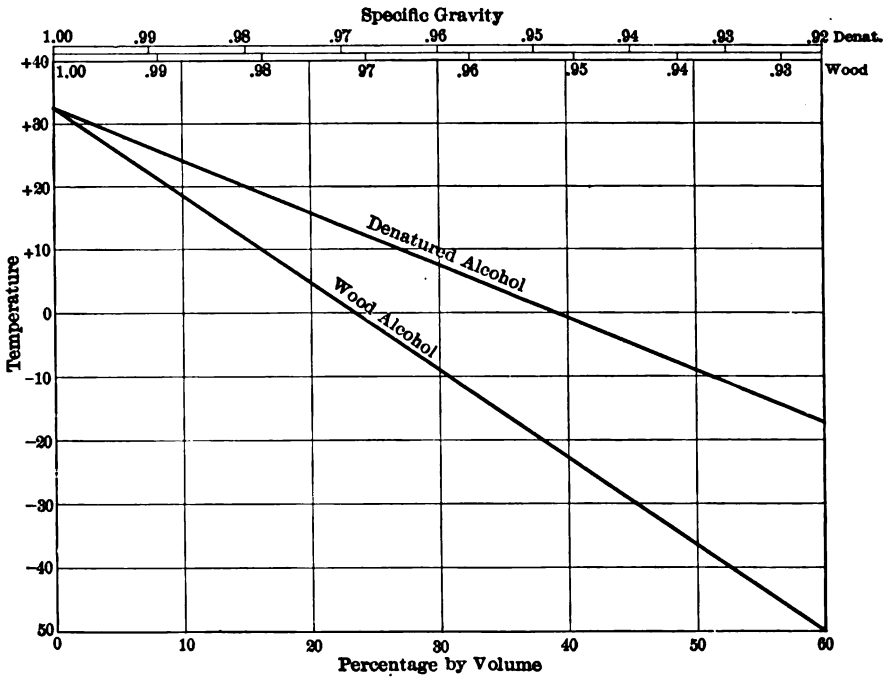

FIG. 2.—Diagram Showing Freezing Temperatures of Mixtures of Alcohol and Water.

STEEL BALLS. "STANDARD" SIZE AND WEIGHTS

Size	Decimal	No. per Pound	Size	Decimal	Ounces
1/16"	.0625	27,904	13/16"	.8125	1 1/2
3/32"	.0937	8,264	7/8"	.8750	1 3/4
1/8"	.1250	3,400	15/16"	.9375	2
5/32"	.1563	1,770	1"	1.000	2 1/2
3/16"	.1875	1,030	1 1/8"	1.125	3 1/2
7/32"	.2188	640	1 1/4"	1.250	4 3/4
1/4"	.2500	430	1 3/8"	1.375	6 1/4
9/32"	.2613	300	1 1/2"	1.500	8
5/16"	.3125	220	1 5/8"	1.625	10
11/32"	.2438	165	1 3/4"	1.750	13
3/8"	.3750	125	1 7/8"	1.875	15 1/2
7/16"	.4375	80	2"	2.000	19 1/4
1/2"	.5000	52	2 1/4"	2.250	27
9/16"	.5625	36	2 1/2"	2.500	37
5/8"	.6250	28	2 3/4"	2.750	49
11/16"	.6875	21	3"	3.000	64
3/4"	.7500	16	3 1/4"	3.250	81 1/2
			3 1/2"	3.500	101 1/2
			3 3/4"	3.750	125
			4"	4.000	152

Index to Tables and Data appears on Pages 23 to 25.

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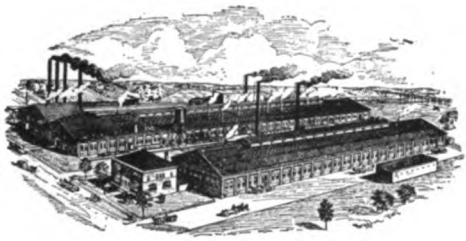

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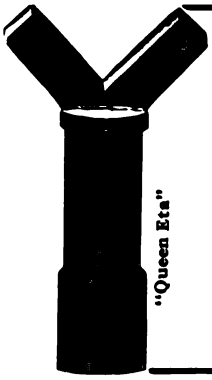

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Write for samples and prices

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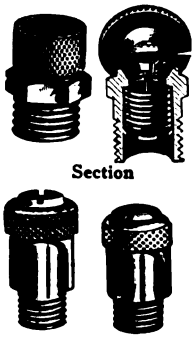

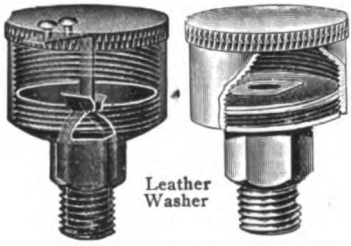

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Model M, " 10.50

Model A, Price $25.00
Model S, " 12.00

Model H, Price $22.00
Model O, " 10.50

Send for Catalogue **Phinney-Walker Keyless Clock Co. 77 East 130th St., New York**

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DIMENSIONS AND LOAD CAPACITY OF BALL BEARINGS (STANDARD)

Inside Diameter		Outside Diameter		Width or Thickness		Load, Lbs.
Inch	MM.	Inch	MM.	Inch	MM.	
0.3937	10	1.3780	35	0.4331	11	200
0.4724	12	1.4567	37	0.4724	12	250
0.5905	15	1.6535	42	0.5118	13	280
0.6693	17	1.8504	47	0.5512	14	370
0.7874	20	2.0472	52	0.5905	15	450
0.9843	25	2.4409	62	0.6693	17	600
1.1811	30	2.8346	72	0.7480	19	850
1.3780	35	3.1496	80	0.8268	21	1100
1.5748	40	3.5433	90	0.9055	23	1500
1.7717	45	3.9370	100	0.9843	25	1800
1.9685	50	4.3331	110	1.0630	27	2100
2.1654	55	4.7245	120	1.1417	29	2400
2.3622	60	5.1183	130	1.2205	31	2900
2.5591	65	5.5119	140	1.2992	33	3300
2.7559	70	5.9056	150	1.3780	35	4000
2.9528	75	6.2993	160	1.4567	37	4400
3.1496	80	6.6930	170	1.5354	39	5000
3.3465	85	7.0867	180	1.6143	41	5700
3.5433	90	7.4804	190	1.6929	43	6400
3.7402	95	7.8741	200	1.7717	45	7000
3.9370	100	8.4346	215	1.8505	47	7700
4.1339	105	8.8583	225	1.9291	49	8400
4.3331	110	9.4489	240	1.9685	50	10000

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Standard Roller Bearing Company

50th St. and Lancaster Ave., Philadelphia

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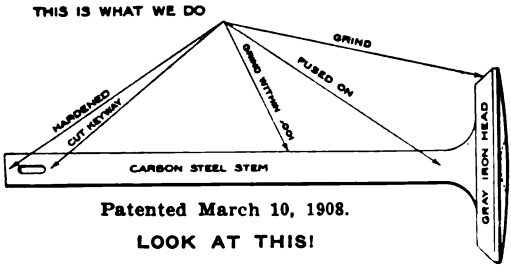
Steel, Bronze and Brass Balls. ...CAPACITY... 500,000,000 ANNUALLY



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Send us your blue prints for estimates, and let us show you what we've got.

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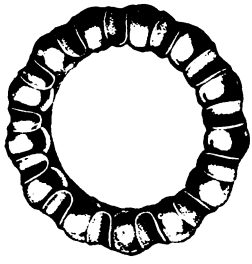
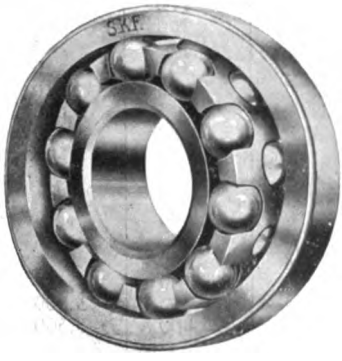
RHINELAND MACHINE WORKS COMPANY

DUSSELDORF

Radial, Thrust, Cone Type



140 W. 42d Street **New York, N. Y.**



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Highest grade of Swedish Steel.
Two Rows of balls.

S. K. F. Ball Bearing Company

50 CHURCH ST., NEW YORK

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DIMENSIONS AND LOAD CAPACITY OF ANNULAR BALL BEARINGS ("NEW DEPARTURE" RADIAL AND THRUST)

DIMENSIONS

Bearing Number	Bore		Diameter		Width	
	Inches	MM.	Inches	MM.	Inches.	MM.
300	.3937	10	1.3779	35	.7500	19.05
301	.4724	12	1.4567	37	.7500	19.05
302	.5905	15	1.6534	42	.7500	19.05
303	.6693	17	1.8504	47	.8750	22.22
304	.7874	20	2.0472	52	.8750	22.22
305	.9842	25	2.4409	62	1.0000	25.40
306	1.1811	30	2.8346	72	1.1875	30.16
307	1.3779	35	3.1496	80	1.3750	34.92
308	1.5748	40	3.5433	90	1.3750	34.92
309	1.7716	45	3.9370	100	1.5625	39.69
310	1.9685	50	4.3307	110	1.7500	44.45
311	2.1653	55	4.7244	120	1.9375	49.21
312	2.3622	60	5.1181	130	2.1250	53.97
313	2.5590	65	5.5118	140	2.3125	58.74
314	2.7559	70	5.9055	150	2.5000	63.50
315	2.9527	75	6.2992	160	2.6875	68.26
316	3.1496	80	6.6929	170	2.6875	68.26
317	3.3464	85	7.0866	180	2.8750	73.05
318	3.5433	90	7.4803	190	2.8750	73.05
319	3.7401	95	7.8740	200	3.0625	77.79
320	3.9370	100	8.4645	215	3.2500	82.55
321	4.1338	105	8.8582	225	3.4375	87.31
322	4.3307	110	9.4488	240	3.6250	92.07

The following table gives the maximum steady load capacity in pounds at different speeds. It is based upon the relation existing between load and speed to give equal life of bearings under different loads and speeds stated. The law of decreasing loads for increasing speeds applies.

LOAD CAPACITY

Number of Bearing	300 R.P.M.	600 R.P.M.	1,000 R.P.M.	1,500 R.P.M.	2,000 R.P.M.	3,000 R.P.M
300	400	280	220	170	150	130
301	440	310	240	200	170	140
302	500	350	270	220	190	160
303	620	440	340	280	240	200
304	690	480	370	300	260	220
305	990	700	540	440	380	320
306	1,350	950	730	600	520	430
307	2,000	1,400	1,040	880	770	630
308	2,340	1,700	1,300	1,060	930	760
309	2,800	1,960	1,500	1,240	1,040	880
310	3,500	2,500	1,920	1,580	1,380	1,120
311	4,150	2,900	2,200	1,820	1,600	1 300
312	5,300	3,700	2,900	2,300	2,000	1,660
313	6,200	4,300	3,300	2,700	2,400	1,920
314	7,200	5,000	3,800	3,100	2,700	2,200
315	8,250	5,700	4,400	3,600	3,100	2,500
316	9,200	6,400	5,000	4,000	3,500	2,900
317	10,420	7,300	5,600	4,600	4,000	3,300
318	11,260	7,900	6,100	5,000	4,300	3,500
319	12,720	8,900	6,800	5,600	4,900	4,000
320	14,250	10,000	7,700	6,300	5,500	4,500
321	15,890	11,200	8,600	7,000	6,200	5,000
322	17,600	12,320	9,500	7,700	6,800	5,500

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ANNULAR (RADIAL) BALL BEARINGS—HESS-BRIGHT: DWF

Light	Medium	Heavy	Bore m/m	Bore Inches	Diam. m/m	Diam. Inches	Width m/m	Width Inches	Radial Load	Weight in Lbs.	Ball Diam.
200			10	0.3937	30	1.1811	9	0.3543	120	0.09	3/16
	300		10	0.3937	35	1.3779	11	0.4331	200	0.11	1/4
201			12	0.4724	32	1.2598	10	0.3937	140	0.10	3/16
	301		12	0.4724	37	1.4567	12	0.4724	240	0.14	1/4
202			15	0.5905	35	1.3779	11	0.4331	160	0.12	3/16
	302		15	0.5905	42	1.6535	13	0.5118	280	0.19	1/4
203			17	0.6693	40	1.5748	12	0.4724	250	0.18	7/32
	303		17	0.6693	47	1.8503	14	0.5512	370	0.25	5/16
		403	17	0.6693	62	2.4410	17	0.6693	850	0.56	1/2
204			20	0.7874	47	1.8503	14	0.5512	320	0.23	1/4
	304		20	0.7874	52	2.0473	15	0.5905	440	0.33	5/16
		404	20	0.7874	72	2.8346	19	0.7480	1050	0.85	9/16
205			25	0.9842	52	2.0473	15	0.5905	350	0.26	1/4
	305		25	0.9842	62	2.4410	17	0.6693	620	0.53	3/8
		405	25	0.9842	80	3.1496	21	0.8268	1320	1.14	5/8
206			30	1.1811	62	2.4410	16	0.6299	550	0.44	5/16
	306		30	1.1811	72	2.8346	19	0.7480	860	0.77	7/16
		406	30	1.1811	90	3.5433	23	0.9055	1600	1.56	11/16
207			35	1.3779	72	2.8346	17	0.6693	600	0.66	5/16
	307		35	1.3779	80	3.1496	21	0.8268	1100	0.98	1/2
		407	35	1.3779	100	3.9370	25	0.9842	1900	2.00	3/4
208			40	1.5748	80	3.1496	18	0.7086	860	0.83	3/8
	308		40	1.5748	90	3.5433	23	0.9055	1450	1.35	9/16
		408	40	1.5748	110	4.3307	27	1.0630	2200	2.58	13/16
209			45	1.7716	85	3.3464	19	0.7480	950	0.96	3/8
	309		45	1.7716	100	3.9370	25	0.9842	1750	1.79	5/8
		409	45	1.7716	120	4.7244	29	1.1417	2500	3.33	7/8
210			50	1.9685	90	3.5433	20	0.7874	1000	1.09	3/8
	310		50	1.9685	110	4.3307	27	1.0630	2100	2.35	11/16
		410	50	1.9685	130	5.1181	31	1.2205	3400	4.18	15/16
211			55	2.1653	100	3.9370	21	0.8268	1160	1.36	7/16
	311		55	2.1653	120	4.7244	29	1.1417	2400	2.99	3/4
		411	55	2.1653	140	5.5118	33	1.2992	3900	5.07	1–

Continued on page 718

Index to Tables and Data appears on Pages 23 to 25.

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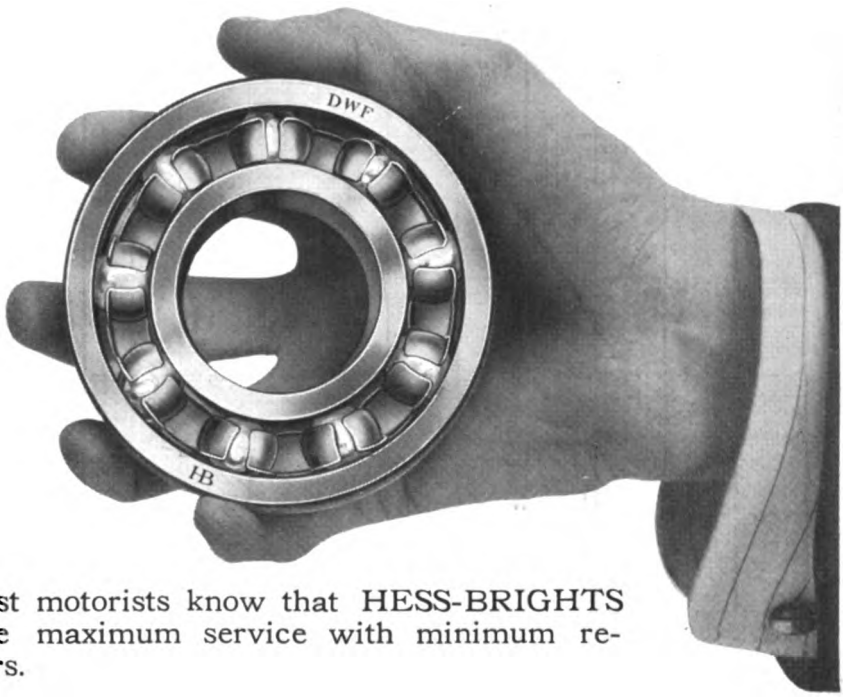
Most Motorists Know

HESS-BRIGHT Ball Bearings When They See Them



Most motorists know that HESS-BRIGHTS give maximum service with minimum repairs.

Most motorists want HESS-BRIGHTS. Most salesmen prefer them.

HESS-BRIGHTS are an asset to any car containing them

Where do YOU stand on the ball bearing question?

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1974 Broadway, New York, N. Y. THE HESS-BRIGHT COMPANY Chicago, Ill., 1800 Michigan Ave.

The more frequently used bearing sizes are also carried in stock by Boston, Mass., THE POST & LESTER CO., Hartford, Conn. CHANSLOR & LYON MOTOR SUPPLY CO., San Francisco, Los Angeles and Fresno, California; Seattle and Spokane, Washington.

THE

HESS-BRIGHT

MANUFACTURING CO., 2101 Fairmount Avenue PHILADELPHIA, PA.

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ANNULAR (RADIAL) BALL BEARINGS—HESS-BRIGHT : DWF—(Continued)

212			60	2.3622	110	4.3307	22	0.8661	1550	1.75	1/2
	312		60	2.3622	130	5.1181	31	1.2205	2800	3 72	13/16
		412	60	2.3622	150	5.9055	35	1.3779	4400	6.12	1– 1/16
213			65	2.5590	120	4.7244	23	0.9055	1670	2.28	1/2
	313		65	2.5590	140	5.5118	33	1.2992	3300	4.49	7/8
		413	65	2.5590	160	6.2992	37	1.4567	4900	7.22	1– 1/8
214			70	2.7559	125	4.9212	24	0.9449	1820	2.50	1/2
	314		70	2.7559	150	5.9055	35	1.3779	4000	5.46	15/16
		414	70	2.7559	180	7.0866	42	1.6535	6200	10.54	1– 1/4
215			75	2.9527	130	1.5181	25	0.9842	2130	2.63	9/16
	315		75	2.9527	160	6.2992	37	1.4567	4400	6.58	1–
		415	75	2.9527	190	7.4803	45	1.7716	6600	13.07	1– 5/16
216			80	3.1496	140	5.5118	26	1.0236	2650	3.22	5/8
	316		80	3.1496	170	6.6929	39	1.5354	5000	7.89	1– 1/16
		416	80	3.1496	200	7.8740	48	1.8897	7300	14.58	1– 3/8
217			85	3.3464	150	5.9055	28	1.1023	2850	3.97	11/16
	317		85	3.3464	180	7.0866	41	1.6142	5700	9.27	1–1/8
		417	85	3.3464	210	8.2677	52	2.0472	8580	18.72	1–7/16
218			90	3.5433	160	6.2992	30	1.1811	3400	4.84	3/4
	318		90	3.5433	190	7.4803	43	1.6929	6400	10.47	1– 3/16
		418	90	3.5433	225	8.8582	54	2.1260	10000	20.15	1– 9/16
219			95	3.7402	170	6.6929	32	1.2598	3750	5.94	3/4
	319		95	3.7402	200	7.8740	45	1.7716	7000	12.27	1– 1/4
		419	95	3.7402	250	9.8425	55	2.1653	11880	27.54	1–11/16
220			100	3.9370	180	7.0866	34	1.3386	3950	7.17	13/16
	320		100	3.9370	215	8.4645	47	1.8504	7700	15.23	1– 5/16
		420	100	3.9370	265	10.4330	60	2.3622	14000	33.44	1–13/16
221			105	4.1338	190	7.4803	36	1.4173	4600	8.48	7/8
	321		105	4.1338	225	8.8582	49	1.9291	8400	17.19	1– 3/8
222			110	4.3307	200	7.8740	38	1.4960	5000	10.26	7/8
	322		110	4.3307	240	9.4488	50	1.9685	10000	20.29	1– 1/2

The number completely identifies each bearing.

The inch dimensions are the nearest equivalents to the even millimeters in which the bearings are made. The metric sizes are retained to ensure interchangeability of the American-made HESS-BRIGHT Bearings with the German and French "DWF."

The loads cited are safe for steady speeds up to 3000 RPM and constant load. For all other conditions, suitable allowances must be made as dictated by experience.

These bearings may be used also for thrust loads, either simple or combined with radial loads. The user is advised to consult with the maker. It is impossible to specify the safe thrust load without knowing fully the conditions of use.

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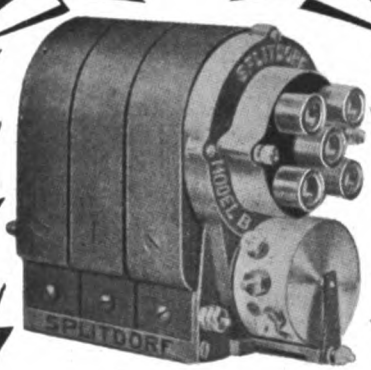
"SPLITDORF MAGNETO-THE BEST IGNITION DEVICE IN THE WORLD"



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DIMENSIONS AND LOAD CAPACITY OF ROLLER BEARINGS

(HYATT STANDARD TYPE)

LIGHT SERIES

Diam't'r of Shaft or Axle.	Diam't'r of Roller.	Bore of Housing.	Length or Space for Bearing Lengthwise and Safe Loads at 500 Revolutions.						
			1 Inch Safe Load.	1½ inch Safe Load.	2 inch Safe Load.	2½ inch Safe Load.	3 inch Safe Load.	3½ inch Safe Load.	4 inch Safe Load.
1.000	.375	1.938	110	180	240	300	360	...	..
1.125	.438	2.188	120	200	270	335	405	475	540
1.188	.500	2.375	140	215	285	360	425	500	570
1.250	.500	2.438	...	225	300	375	450	525	600
1.375	.500	2.563	...	250	330	410	495	570	660
1.438	.563	2.750	...	260	345	430	515	600	690
1.500	.563	2.813	...	270	360	450	540	630	720
1.625	.563	2.938	...	...	390	485	585	685	780
1.688	.563	3.000	...	...	405	505	610	710	810
1.750	.563	3.063	...	...	420	525	630	735	840
1.875	.563	3.188	...	...	450	565	675	785	900
1.938	.625	3.438	...	...	465	580	690	810	930
2.000	.625	3.500	...	...	480	600	720	840	960
2.125	.625	3.625	..	...	510	635	765	890	1020
2.188	.625	3.688	...	...	525	655	785	915	1045
2.250	.625	3.750	...	...	540	675	810	945	1080
2.438	.688	4.063	...	...	585	730	875	1025	1175
2.500	.688	4.125	...	...	600	750	900	1050	1200
2.688	.688	4.313	...	...	...	790	970	1130	1290
2.750	.688	4.375	...	...	...	825	990	1155	1320
2.938	.750	4.688	...	...	...	880	1050	1220	1400
3.000	.750	4.750	...	...	...	900	1080	1260	1440

Continued on page 722

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Hyatt Roller Bearings

HIGH DUTY TYPE OF BEARING.

The Short Series, High Duty Type, of the Hyatt Roller Bearing is furnished in shaft diameters from one to three inches, inclusive, and in lengths from one inch upward. The long Series is furnished in the same diameters and in lengths from two to three and one-half inches.

Special diameters and lengths to meet individual requirements, consistent with proper engineering practice, will be furnished promptly.

The Standard Type of the Hyatt Roller Bearing is furnished in a Heavy or Light Series, distinguished by a variation of the roller diameter. All diameters of shaft from one to three inches, inclusive, and in lengths from two to five inches, are offered.

Hyatt Roller Bearings are correct in design—they are made of thoroughly tested materials—are carefully inspected—wear longer—and have greater practical value than any bearing made.

Hyatt Roller Bearing Co.

Detroit, Michigan

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DIMENSIONS AND LOAD CAPACITY OF ROLLER BEARINGS (Contd.)

(HYATT STANDARD TYPE)

HEAVY SERIES

Diam't'r of Shaft or Axle.	Diam't'r of Roller	Bore of Housing.	Length or Space for Bearing Lengthwise and Safe Loads at 500 Revolutions.						
			1 inch. Safe Load.	1½ inch. Safe Load.	2 inch. Safe Load.	2½ inch. Safe Load.	3 inch. Safe Load.	3½ inch. Safe Load.	4 inch. Safe Load.
.500	.250	1.188	25	45	60	...	...	...	...
.625	.250	1.313	30	50	70	...	...	...	...
.750	.313	1.563	45	80	110	135	...	...	...
.875	.313	1.688	50	90	120	150	...	...	...
1.000	.500	2.188	145	240	320	400	480	560	640
1.125	.500	2.313	160	270	360	450	540	630	720
1.188	.625	2.625	180	285	380	475	570	665	760
1.250	.625	2.688	...	300	400	500	600	700	800
1.375	.625	2.813	...	330	440	550	660	770	880
1.438	.750	3.125	...	345	460	575	690	800	920
1.500	.750	3.188	...	360	480	600	720	840	960
1.625	.688	3.188	...	...	500	625	750	880	1000
1.688	.750	3.375	...	...	540	675	810	945	1080
1.750	.750	3.438	...	...	560	700	840	980	1120
1.875	.750	3.563	...	...	600	750	900	1050	1200
1.938	.875	3.938	...	...	620	775	930	1085	1240
2.000	.875	4.000	...	...	640	800	960	1120	1280
2.125	.750	3.875	...	...	660	825	1000	1150	1320
2.188	.875	4.188	...	...	700	875	1050	1225	1400
2.250	.875	4.250	...	...	720	900	1080	1260	1440
2.438	.938	4.563	...	...	780	975	1170	1365	1560
2.500	.938	4.625	...	...	800	1000	1200	1400	1600
2.688	.938	4.813	...	...	...	1050	1290	1505	1720
2.750	.938	4.875	...	...	...	1100	1320	1540	1760
2.938	1.000	5.188	...	...	...	1175	1410	1645	1808
3.000	1.000	5.250	...	...	...	1200	1440	1680	1920

The safe load is the amount of radial load that a bearing may be subjected to under a maximum speed of five hundred revolutions per minute when operated on a soft shaft or axle of reasonably good quality of material, the latter being the limiting factor. For one thousand revolutions, reduce safe load by one-third and for fifteen hundred, by two-thirds. Note that the bore of housing is stated and that this is not the outside diameter of outer lining. Housings should be bored and then reamed and held within plus or minus one-thousandth inch of size stated. Axles may vary within the limits of commercial material; namely, one thousandth inch over size and one under size. Rollers are accurate within one-half thousandth inch over and one under. Outer linings must be fastened in place.

Continued on page 724

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DIMENSIONS AND LOAD CAPACITY OF ROLLER BEARINGS (Contd.)

(HYATT HIGH DUTY TYPE)

Inside Diameter of Sleeve.	Outside Diameter Over All.	Short Series.		Long Series.	
		Length Over All.	Safe Load in Lbs.	Length Over All.	Safe Load in Lbs.
.750	2.249	1.000	460	2.000	1200
.875	2.374	1.000	500	2.000	1340
1.000	2.874	1.125	750	2.250	1900
1.125	3.374	1.250	960	2.500	2340
1.250	3.499	1.250	1040	2.500	2530
1.375	3.624	1.250	1125	2.500	2730
1.500	3.749	1.250	1200	2.500	2925
1.625	4.124	1.375	1470	2.750	3490
1.750	4.249	1.375	1550	2.750	3700
1.875	4.374	1.375	1650	2.750	3925
2.000	4.749	1.500	2060	3.000	4825
2.250	4.999	1.500	2270	3.000	5300
2.500	5.374	1.750	3030	3.500	6890
2.750	5.624	1.750	3400	3.500	7600

The above series includes the inner steel shell or sleeve and is adapted for operation on soft steel or malleable iron.

Diameter of Shaft or Axle	Outside Diameter Over All.	Short Series.		Long Series.	
		Length Over All.	Safe Load in Lbs.	Length Over All.	Safe Load in Lbs.
1.000	2.249	1.000	460	2.000	1200
1.125	2.374	1.000	500	2.000	1340
1.250	2.749	1.125	700	2.250	1700
1.375	2.874	1.125	750	2.250	1900
1.500	3.374	1.250	960	2.500	2340
1.625	3.499	1.250	1040	2.500	2530
1.750	3.624	1.250	1125	2.500	2730
1.875	3.749	1.250	1200	2.500	2925
2.000	4.124	1.375	1470	2.750	3490
2.125	4.249	1.375	1550	2.750	3700
2.250	4.374	1.375	1650	2.750	3925
2.500	4.749	1.500	2060	3.000	4820
2.750	4.999	1.500	2270	3.000	5300
3.000	5.374	1.750	3030	3.500	6890
3.250	5.624	1.750	3400	3.500	7600

The above series omits the inner steel shell or sleeve and necessitates the use of a heat-treated or hardened axle or shaft.

The safe load is the amount of radial load that a bearing may be subjected to under a maximum speed of one thousand revolutions per minute. These will stand severe shocks, due to the nature of the roller. Diameters are accurate within plus or minus one-thousandth inch. Lengths are full size to ten thousandths inch less. Where inner sleeves are used it is important that they be a close fit to the shaft or axle.

Index to Tables and Data appears on Pages 23 to 25.

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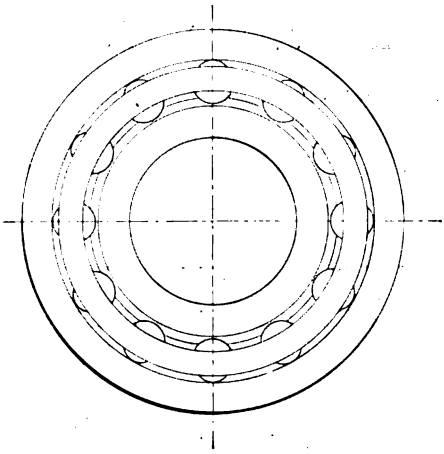
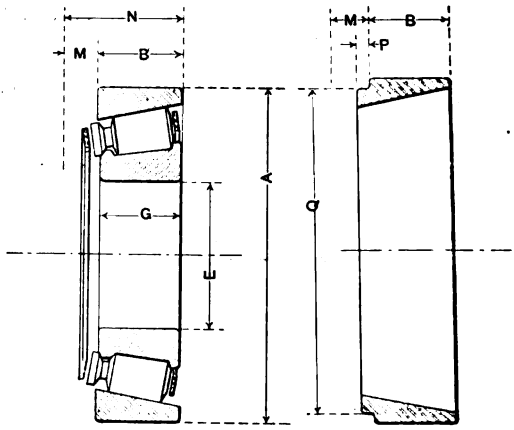
ANNULAR REPLACEMENT ROLLER BEARINGS (TIMKEN)





Cup on Bearings 416 and 441 only

NOTE.—1/32 inch radius at each end of cone is standard. 1/32 inch radius at each end of cup is standard The loads given in table are safe for speeds not exceeding 500 r.p.m. For speeds from 500 to 1,000 r.p.m use 75 per cent. of the rated loads. For speeds over 1,000 r.p.m. confer with the makers

	P. Inches	Q. Inches
*Bearing 416	.1300	3.1500
441	.1000	3.2500

Bearing Number	E Cone I. D., Inches	G Cone, Length	A Cup O. D., Inches	B Cup, Length	M Clearance at Rear of Cup, Inches	N Approx. Length Required, Inches	Capacity Pounds
237	.9842	3/4	2.4410	.6693	3/8	1.04	270
259	1.3779	3/4	2.8346	.6693	3/8	1.04	335
277	1.5748	3/4	3.1496	.7086	3/8	1.08	400
305	.7874	7/8	2.8346	.7480	3/8	1.12	475
318	.9842	7/8	3.1496	.8268	3/8	1.20	520
319	1.1811	7/8	2.8346	.7480	3/8	1.12	520
339	1.3779	7/8	3.1496	.8268	3/8	1.20	625
357	1.5748	7/8	3.5433	.9055	3/8	1.28	675
358	1.7716	7/8	3.3464	.7480	3/8	1.12	675
365	1.9685	7/8	3.5433	.7874	3/8	1.16	700
376	1.7716	7/8	3.9370	.9842	3/8	1.35	725
385	2.1653	7/8	3.9370	.8268	3/8	1.20	775
396	1.9685	7/8	4.3307	1.0630	3/8	1.43	830
397	2.3622	7/8	4.3307	.8661	3/8	1.24	830
*416	1.1811	1 1/8	3.5433	.9055	1/2	1.40	950
*441	1.3779	1 1/8	3.9370	.9842	1/2	1.48	1225
459	1.5748	1 1/8	4.3307	1.0630	1/2	1.56	1330
475	2.1653	1 1/8	4.7244	1.1417	1/2	1.64	1500
476	2.3622	1 1/8	5.1181	1.2205	3/8	1.59	1500

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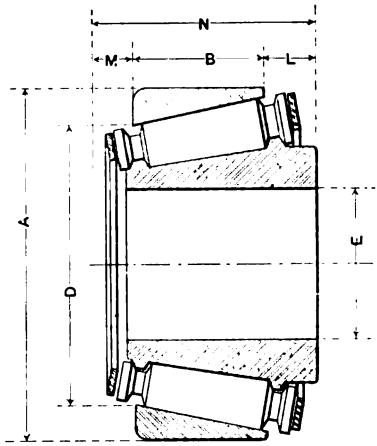
LONG SERIES ROLLER BEARINGS (TIMKEN)



Bearing Number	Dimensions of Hole in Cone: E Cone I. D. Straight or Taper, Ins.		Taper Per Foot	Radius Large End	A Cup O. D., Inches	B Cup, Length	D Clearance for Operation of Rolls, Inches	L Cone Stands Out of Cup, Inches	M Clearance at Rear of Cup, Inches	Capacity in Pounds
1150	5/8	St.	....	None	1.7500*	5/8	1 13/32	13/32	5/16	135
1350	15/16	Tap.	7/8	9/64	2.0000*	5/8	1 5/8	5/16	5/16	165
1550	3/4	St.	....	None	1.8025	5/8	1 1/2	13/32	5/16	135
1750	1	Tap.	5/8	9/64	2.1250*	5/8	1 23/32	5/16	5/16	200
1951	1 7/32	Tap.	15/16	9/64	2.2400	5/8	1 13/16	13/32	5/16	200
1954	1 1/8	St.	....	None	2.2400	5/8	1 13/16	13/32	5/16	200
2350	15/16	St.	....	None	2.2400	13/16	1 27/32	1/2	5/16	270
2356	1	St.	....	9/64	2.2400	13/16	1 27/32	1/2	5/16	270
2550	1 3/8	Tap.	3/4	9/64	2.6150	13/16	2 5/32	13/32	5/16	335
2554	15/16	St.	....	9/64	2.6150	13/16	2 5/32	13/32	5/16	335
2650	1	St.	....	None	2.4843	3/4	2 1/16	17/32	3/8	335
2654	13/16	St.	....	9/64	2.4843	3/4	2 1/16	17/32	3/8	335
2750	1 1/2	Tap.	1 1/8	9/64	3.0000	3/4	2 3/8	7/16	3/8	400
2762	1 1/2	St.	....	9/64	3.0000	3/4	2 3/8	7/16	3/8	400
3150	13/16	St.	....	None	2.8593	15/16	2 3/16	17/32	3/8	520
3159	15/16	St.	....	9/64	2.8593	15/16	2 3/16	17/32	3/8	520
3351	1 3/8	St.	....	None	3.1562	15/16	2 19/32	17/32	3/8	625
3364	1 5/8	St.	....	9/64	3.1562	15/16	2 19/32	17/32	3/8	625
3554	1 3/4	St.	....	9/64	3.3125	15/16	2 3/4	1/2	3/8	675
3650	13/16	St.	....	None	2.4375	15/16	1 29/32	1/2	3/8	470
3750	1 31/32	Tap.	1	13/64	3.6718	15/16	3	1/2	3/8	725
3762	2	St.	....	9/64	3.6718	15/16	3	1/2	3/8	725
3955	2 1/2	St.	....	9/64	4.4375	15/16	3 19/32	1/2	3/8	830
4353	1 1/2	St.	....	None	3.4843	15/16	2 25/32	11/16	7/16	1140
4364	1 3/4	St.	....	9/64	3.4843	15/16	2 25/32	1/2	7/16	1140
4550	2 1/8	Tap.	1	1/4	3.9843	15/16	3 1/4	1/2	7/16	1330
4554	2	St.	....	9/64	3.9843	15/16	3 1/4	1/2	7/16	1330
5350	1 3/4	St.	....	None	3.9843	1 7/16	3 7/32	7/8	1/2	1550
5351	2	St.	....	None	3.9843	1 7/16	3 7/32	7/8	1/2	1550
5355	2	St.	....	None	3.9843	1 7/16	3 7/32	5/8	1/2	1550
5550	2 5/8	Tap.	15/16	17/64	4.7343	1 7/16	3 27/32	5/8	1/2	1935
5553	2 5/8	St.	....	None	4.7343	1 7/16	3 27/32	5/8	1/2	1935
6350	2 1/4	St.	....	None	5.1875	1 3/4	4 5/32	1 1/32	5/8	3680
6451	3 1/16	Tap.	1 7/16	5/16	5.8750	1 3/4	4 19/32	3/4	5/8	3960
6550	3 3/8	Tap.	1 7/16	5/16	6.3125	1 3/4	5 3/32	29/32	5/8	5100
6552	3 1/2	St.	....	9/64	6.3125	1 3/4	5 3/32	29/32	5/8	5100

*On these cups, radius at back corner is 1/32 inch; on all others radius is 1/8 inch.

Loads given in above table are safe for speeds not exceeding 500 r.p.m. For speeds from 500 to 1,000 r.p.m. use 75 per cent. of the above rated loads. For speeds over 1000 r.p.m. confer with the makers.

N = M + B + L.

Index to Tables and Data appears on Pages 23 to 25.

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A Crank Without a Kick

Start Your Car from the Seat

Positively No Danger From Back Fire

The Star Starter is designed to do away with the present dangerous and uncertain method of cranking; to eliminate every possibility of back fire on gasoline engines. It offers the most dependable and safe method of starting an automobile—a lever operated from the seat sets the engine in action, on either 2, 4 or 6 cylinders.

Not an experiment—the efficiency of the Star Starter has been amply demonstrated during the past year by practical service on cars of various manufacture. It represents a definite advance over old methods.

Saves gasoline; minimizes the wear of the engine; reduces maintenance expenses; insures safety.

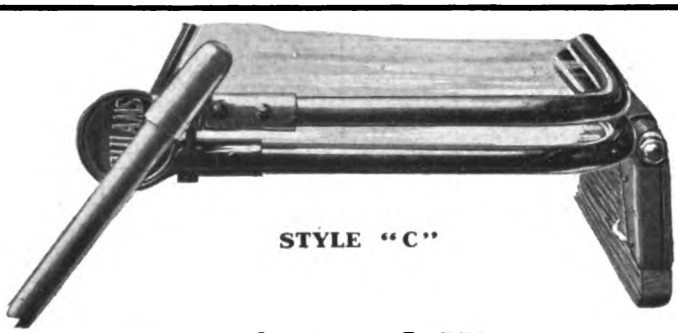
Price is right, terms are right, too, and we'll make it worth while for live dealers to get in line now for 1911 business.

Can be attached to any make of car or commercial truck without touching the motor.

THE STAR STARTER CO.

147-151 West 49th St., New York

WILLIAMS SHIELDS



STYLE "C"

For Wind and Wave

AUTOMOBILE—AEROPLANE—MOTOR BOAT

Write for Catalog

20th Century Motor Car Supply Co.

SOUTH BEND, INDIANA

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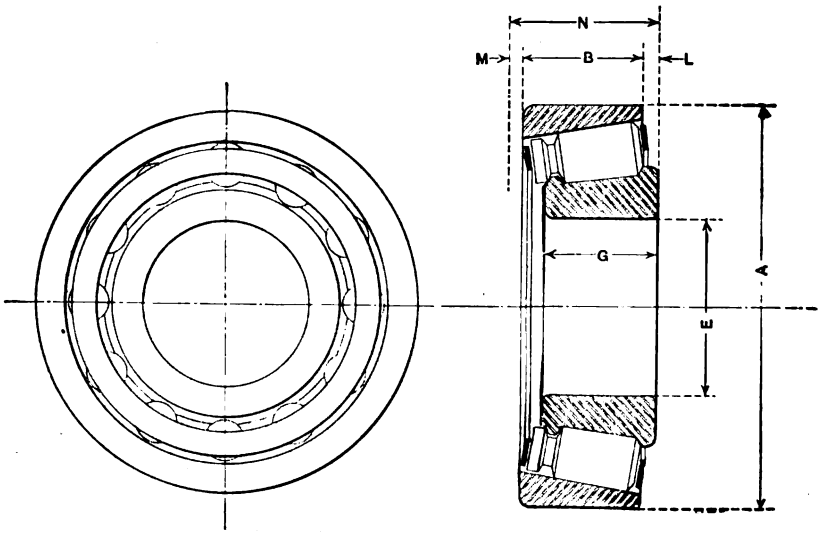
SHORT SERIES ROLLER BEARINGS (TIMKEN)



Note.—1/32-inch radius at each end of cone is standard. Total length required for bearing — N = M + B + L.

NOTE.—1/32 inch radius at end of cone is standard. The loads given are safe for speeds not exceeding 500 r.p.m. For speeds from 500 to 1,000 r.p.m. use 75 per cent. of above rated loads. For speeds over 1,000 r.p.m. confer with the makers.

M Clearance at Rear of Cup. Inches	Capacity in Pounds	E Diameter Hole in Cone, Inches	G Length of Cone, Inches	A Outside Diameter Cup, Inches	B Length of Cup, Inches	L Cone Stands Out of Cup, Ins.	M Clearance at Rear of Cup. Inches
235	270	15/16	3/4	2.2400	13/16	5/32	1/16
236	270	1	3/4	2.2400	13/16	5/32	1/16
255	335	1 1/4	3/4	2.6150	13/16	5/32	1/16
256	335	15/16	3/4	2.6150	13/16	5/32	1/16
257	335	13/16	3/4	2.6150	13/16	5/32	1/16
275	400	1 3/8	3/4	3.0000	3/4	5/32	1/8
276	400	19/16	3/4	3.0000	3/4	5/32	1/8
315	520	1	7/8	2.8593	15/16	1/8	1/16
316	520	13/16	7/8	2.8593	15/16	1/8	1/16
317	520	15/16	7/8	2.8593	15/16	1/8	1/16
335	625	1 3/8	7/8	3.1562	15/16	1/8	1/16
336	625	1 5/8	7/8	3.1562	15/16	1/8	1/16
337	625	1 1/2	7/8	3.1562	15/16	1/8	1/16
355	675	1 3/4	7/8	3.3125	15/16	1/8	1/16
375	725	2	7/8	3.6718	15/16	1/8	1/16
395	830	2 1/2	7/8	4.4375	15/16	1/8	1/16
415	915	1 1/2	1 1/8	3.2500	1 3/16	3/16	1/16
435	1140	1 3/4	1 1/8	3.4843	1 5/16	3/16	1/16
440	1140	1 1/2	1 1/8	3.4843	1 5/16	3/16	1/16
455	1330	2	1 1/8	3.9843	1 5/16	3/16	1/16
456	1330	2 1/8	1 1/8	3.9843	1 5/16	3/16	1/16

Index to Tables and Data appears on Pages 23 to 25.

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Timken

Roller Bearings

are accepted as the best for all automobile applications.

CONSULTATION SERVICE

Our engineering department is at the disposal of anyone, whether customer or not, for advice and suggestion as to the methods of construction and proper means of best meeting and taking care of any bearing applications.

Your sketches, blue prints and data will be used for your benefit solely. In making inquiry for bearing recommendations, advise us as fully as possible as to weight of car, number of passengers (or load, if truck), distribution of weight, front and rear, horsepower and speed of engine, and any other data to help us to intelligently recommend most suitable bearings for your particular needs.

We are doing this work daily, and have been for years, therefore, know we can be of service to you as we have been to the majority of successful Automobile builders in this country.

The Timken Roller Bearing Company
CANTON, OHIO

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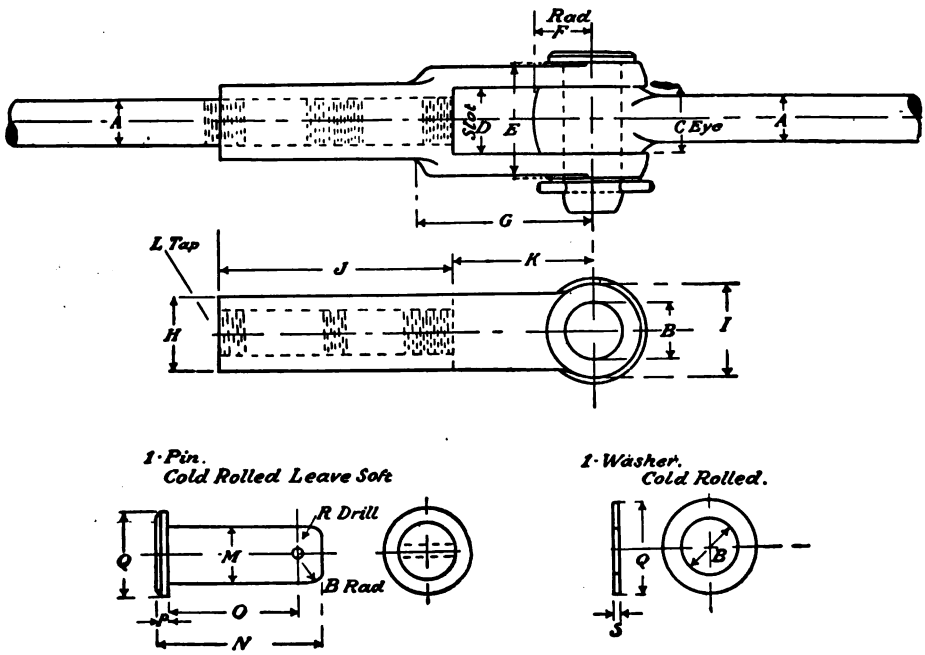
A. L. A. M. STANDARD ADJUSTABLE YOKE AND EYE ROD END

Material: No. 5 A. L. A. M. Steel. Screw threads on adjustable and eye rod end, A. L. A. M. Standard.



A	1/4	5/16	3/8	7/16	1/2
B	5/16	13/32	15/32	9/16	5/8
C	.432	.495	.588	.651	.770
D	7/16	1/2	19/32	21/32	3/4
E	3/4	7/8	1	1 1/8	1 1/4
F	3/8	7/16	1/2	17/32	5/8
G	1 1/4	1 3/8	1 1/2	1 11/16	1 7/8
H	1/2	7/16	21/32	3/4	13/16
I	11/16	3/4	7/8	15/16	1 1/16
J	1 3/8	1 5/8	1 7/8	2 1/4	2 1/2
K	1	1 1/8	1 1/4	1 3/8	1 1/2
L	A-28	A-24	A-24	A-20	A-20
M	.310	.403	.465	.559	.621
N	1 3/32	1 1/4	1 7/16	1 5/8	1 3/4
O	53/64	61/64	1 3/32	1 17/64	1 3/8
P	3/32	3/32	1/8	1/8	1/8
Q*	1/2	5/8	3/4	7/8	15/16
R	5/64	5/64	7/64	9/64	11/64
S	1/32	1/32	1/32	1/16	1/16

*For 1/2-in. rod, washer = 1-in., outside diameter.

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Cleveland-Canton "Chreme Vanadium" Automobile Springs

Quick Delivery Assured

These remarkable springs are manufactured from a special type of Vanadium Steel — a steel that will carry forty tons to the square inch without taking permanent set.

Heat Treated in oil — not merely flashed in oil or chilled with water — the springs are full of life and elasticity, yet so tough and strong that they can be absolutely relied upon in emergencies.

OUR high grade springs are known to the trade as follows:

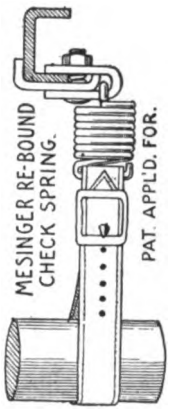
Best Grade—"Chrome Vanadium"
Next Grade—"Special Analysis"

Quality, Not Quantity

The Cleveland-Canton Spring Co.
Canton, Ohio

NEW BUT THOUSANDS IN USE ALREADY

THE MESINGER RE-BOUND CHECK SPRING can be attached in ten minutes without expense.



GUARANTEE

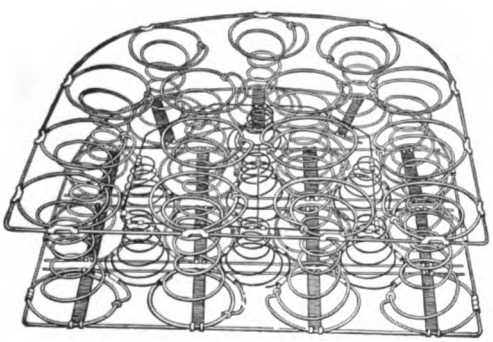
We refund the money if the springs do not prove satisfactory the first month. Express and transportation have to be paid by the purchaser.

Made in three sizes compared with the weight of the Automobile.

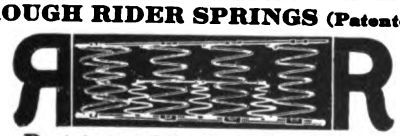
No. 1—For cars up to 1200 lbs., $3.00 per pair
No. 2—For cars up to 1800 lbs., $4.50 per pair
No. 3—For cars above 1800 lbs., $6.00 per pair

Compare quality and price with others.

H. & F. MESINGER MFG. CO.
1801-1803 First Avenue, New York



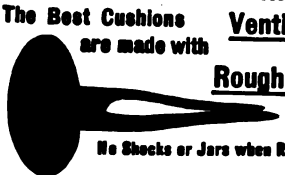
ROUGH RIDER SPRINGS (Patented)



Best Automobile Spring Ever Made

No Possible Bumps or Jars **See these Auxiliary Springs?**

The Best Cushions are made with



Ventilated Buttons
AND
Rough Rider Springs

NOTHING SO COMFORTABLE

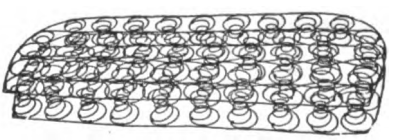
No Shocks or Jars when Rough Riders are used

Manufactured by

JACKSON CUSHION SPRING CO., Jackson, Mich.
RANDOLPH EDWARDS CO. Exclusive Selling Agents

THE WING PATTERN CUSHION SPRING

shown below is used by all the leading manufacturers of Automobiles in the East and has stood the test of ten years' service with satisfaction alike to makers of Cars as well as users.



Cushion Spring (Wing Pattern) for Auto Seats

Manufactured by

THE CHARLES WING CO.
Amesbury, Mass., U. S. A.

Manufacturers of Auto Top Straps and Straps and Trimmings of many varieties, also wholesale dealers in all classes of Automobile Upholstering Leather and other materials.

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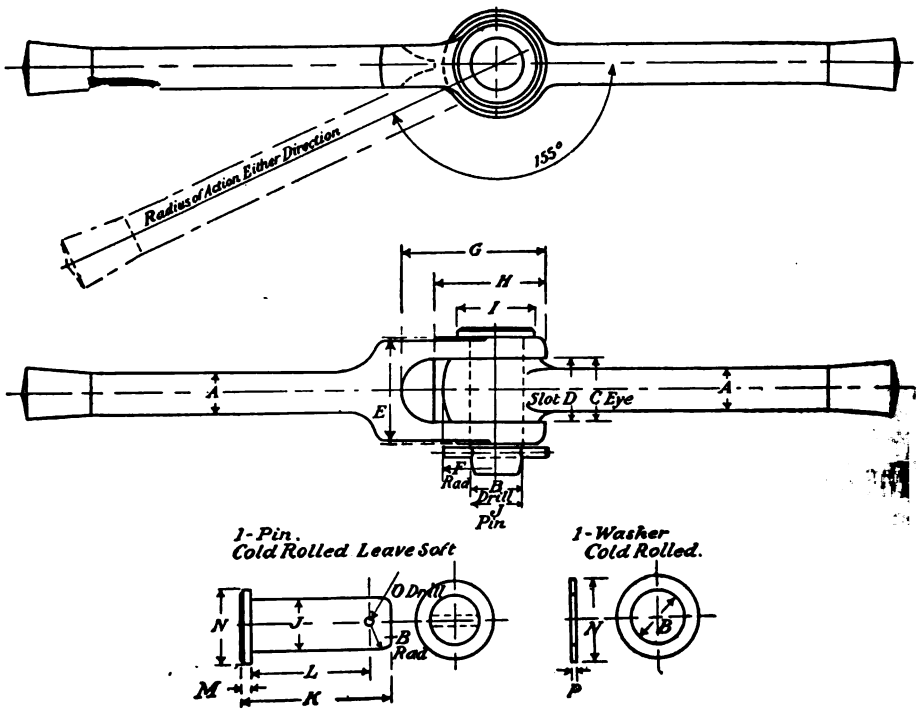
A. L. A. M. STANDARD SOLID YOKE AND EYE ROD END

Material: No. 5 A. L. A. M. Steel.



A	¼	5/16	⅜	7/16	½
B	5/16	13/32	15/32	9/16	⅝
C	.432	.495	.588	.651	.770
D	7/16	½	19/32	21/32	¾
E	¾	⅞	1	1⅛	1¼
F	⅜	7/16	½	17/32	⅝
G	1 1/32	1 7/32	1⅜	1 9/16	1 11/16
H	25/32	15/16	1 1/16	1 5/32	1 5/16
I	½	⅝	¾	⅞	15/16
J	.310	.403	.465	.559	.621
K	1 3/32	1¼	1 7/16	1⅝	1¾
L	53/64	61/64	1 3/32	1 17/64	1⅜
M	3/32	3/32	⅛	⅛	⅛
N*	½	⅝	¾	⅞	15/16
O	5/64	5/64	7/64	9/64	11/64
P*	1/32	1/32	1/32	1/16	1/16

Index to Tables and Data appears on Pages 23 to 25.

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La Porte BODIES

Made either of wood or metal, painted and upholstered complete, or in the white.

We are now building 1000 fore door bodies for one of the best concerns in the country. Our factory is large and fully equipped. As we have been making automobile bodies for several years, we can offer not only excellent facilities but a valuable experience so necessary to satisfactory service.

La Porte Carriage Co.

La Porte, Indiana

The "NEW BRITAIN"

Vise Stand and Bench

For

Chippers **Assemblers**
Filers **Erectors**

A solid Vise Mount, that just fits in the Assembling Room.

May be set anywhere desired, can be had without tray, if preferred, and it's just as handy as it looks.

Write now for prices.

The New Britain Machine Co.

10 Bigelow Street,

NEW BRITAIN, CONN., U. S. A.

Large Profits in Tire Repairing

either as part of a garage and general auto repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired —every motorist in your vicinity is a possible customer for tire repairing. Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairmen.

Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part. Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business. Get into correspondence with us to-day. Write for Bulletin 12 anyway.

Casing Repair Vulcanizers
Air Compressors and Tanks
Steam Boilers
Inside Patch Vulcanizers
Buffing Stands
Tube Repair Vulcanizers
Pot Heaters and Steel Vulcanizers
Coil Springs for Retreading
Retreading Molds, etc., etc.
Rotary Rasps, Wire Brushes

Write to-day—now—for Catalog 12.

The Williams Foundry & Machine Co., Ash St., Akron, O.

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ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS' STANDARD FOR HEXAGON HEAD SCREWS, CASTLE AND PLAIN NUTS.

The present United States standards for Bolts, Nuts and Screw-threads were established by the United States Navy Department in May, 1868. These standards remained pre-eminent for many years and have proved of great convenience and value. During recent years, however, manufacturers of fine machinery have found from experience that for a large portion of their work the United States standards for pitch of threads have been too coarse, and the dimensions of heads and nuts too large. In order to secure satisfactory construction special fine pitch screw-threads and smaller nuts have had to be made. The number and variety of these special threads and nuts have finally become such that great confusion, inconvenience and expense have been caused. To overcome this condition the Association of Licensed Automobile Manufacturers has adopted a new Screw Standard which is herewith set forth.

It is assumed that where screws are to be used in soft material, such as cast-iron, brass, bronze or aluminum, the existing United States standard pitches will be used.

A. L. A. M. STANDARD

This standard is to be known as "Association of Licensed Automobile Manufacturers' Standard for Hexagon Head Screws, Castle and Plain Nuts."

The term "Screw" is intended to supplant the present so-called "coupling-bolt" and "cap-screw."

The term "Plain Hexagon Nut" is intended to supplant the present so-called "United States Standard Nut."

The term "Castle Nut" is given to a new nut, which is intended to be used where a positive locking system is desired.

The term "Facing" is given to a relieved portion under the screw heads, castle nuts and plain nuts.

The detailed dimensions and specifications of the screws, castle and plain nuts, from one-quarter ($\frac{1}{4}''$) inch to ($1''$) inch inclusive, are as follows:

(Continued on page 738)

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Hartford Machine Screw Company

Any Turned or Milled Piece used on any automobile is within our line of manufacture

Gear Blanks	Thumb Nuts
Hub Caps	Clutch Parts
Turnbuckles	Turned Washers
Screws	Turned Rivets
Nuts	Transmission Parts
Studs	Crank Sleeves
Cam Rollers	Plugs
Taper Pins	Knobs
Spark Plugs	Posts
Pinions	Yoke Pins
Ball Cups	Collars
Ball Cones	Dowel Pins
Chain Studs	Coupling Bolts
Chain Rolls	Couplings
Binding Posts	Steering Gear Spindles
Valve Stems	

Hartford, Conn., U.S.A.

A. L. A. M. Standard Screws and Nuts

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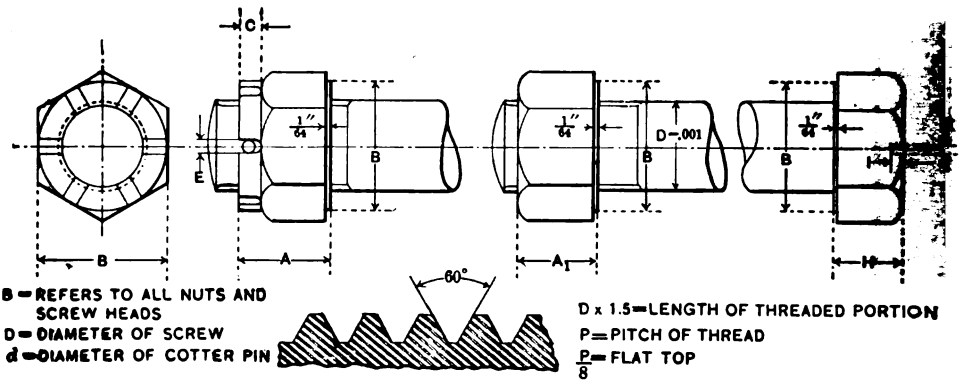
DIMENSIONS



D	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	1
P	28	24	24	20	20	18	18	16	16	14	14
A	$\frac{9}{32}$	$\frac{21}{64}$	$\frac{13}{32}$	$\frac{29}{64}$	$\frac{9}{16}$	$\frac{39}{64}$	$\frac{23}{32}$	$\frac{49}{64}$	$\frac{13}{16}$	$\frac{29}{32}$	1
A_1	$\frac{7}{32}$	$\frac{17}{64}$	$\frac{21}{64}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{31}{64}$	$\frac{35}{64}$	$\frac{19}{32}$	$\frac{21}{32}$	$\frac{49}{64}$	$\frac{7}{8}$
B	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{15}{16}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{7}{16}$
C	$\frac{9}{32}$	$\frac{9}{32}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
E	$\frac{5}{64}$	$\frac{5}{64}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{5}{32}$
H	$\frac{3}{16}$	$\frac{15}{64}$	$\frac{9}{32}$	$\frac{21}{64}$	$\frac{3}{8}$	$\frac{27}{64}$	$\frac{15}{32}$	$\frac{33}{64}$	$\frac{9}{16}$	$\frac{21}{32}$	$\frac{3}{4}$
I	$\frac{3}{32}$	$\frac{7}{64}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
K	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$
d	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

(Continued on page 740.)

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WE have provided ourselves with a Supply of Special Material, also Taps and Gauges, and are prepared to furnish

Hexagon Head Screws, Nuts, etc.

which we guarantee fully up to the Specifications of the A. L. A. M.

Send us your specification

DETROIT SCREW WORKS

DETROIT, MICH.

Standard Set and Cap Screws, Steel Taper Pins, Coupling Bolts, Nuts, etc.

"ANYTHING TURNED FROM BAR"

HARDENED and GROUND WORK OUR SPECIALTY

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SPECIFICATIONS

Material.—A better material than ordinarily used for screws is deemed necessary. The selection of a better material depends to a considerable extent upon the possibility of commercially machining it in screw machines. Such material has been found in several qualities of steel, having a tensile strength of not less than one hundred thousand (100,000 lb.) pounds per square inch, and an elastic limit of sixty thousand (60,000 lb.) pounds per square inch, as compared with fifty or sixty thousand (50,000 or 60,000 lb.) pounds per square inch tensile strength and thirty-five thousand (35,000 lb.) pounds per square inch elastic limit now in common use.

The Screws and Nuts described in this Standard are to be made of this better material.

Screws are to be left soft.

Screw Heads are to be left soft.

The Plain Nuts are to be left soft.

The Castle Nuts are to be case-hardened.

Tolerance.—The body diameter of the screws shall be one-thousandth (.001″) inch less than the nominal diameter, with a plus tolerance of zero and a minus tolerance of two-thousandths (.002″) inch.

The nuts shall be a good fit, without perceptible shake.

The clearance between tops of threads and bottoms of threads in nuts shall be that existing in the present practice of machine screw makers; that is, the tap shall be between two-thousandths (.002″) inch and three-thousandths (.003″) inch large.

Finish.—Screw heads shall be flat chamfered.

Plain nuts shall be flat chamfered.

Castle nuts shall be chamfered.

What is understood by screw makers as "semi-finish" shall be the finish for all heads and nuts.

Index to Tables and Data appears on Pages 23 to 25.

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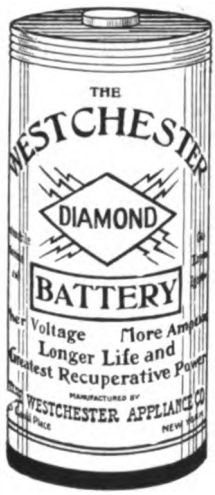
WESTCHESTER Dry Battery



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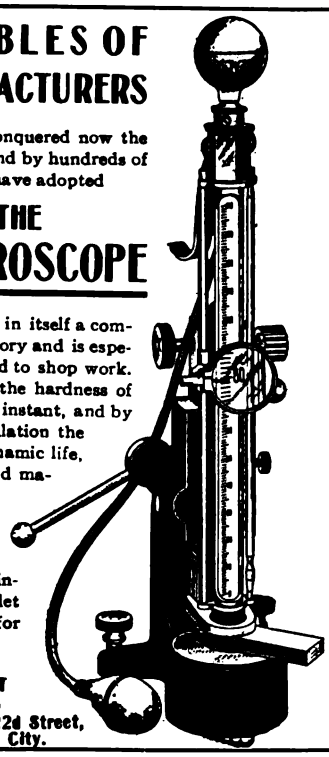

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INTERNATIONAL (METRIC SYSTEM) STANDARD 60° THREAD

Diameter of Screw	Pitch	Diameter at Root of Thread	Width of Flat at Top and Bottom of Thread
Millimetres	*Millimetres*	*Millimetres*	*Millimetres*
3	.5	2.35	.06
4	.75	3.03	.09
5	.75	4.03	.09
6	1.0	4.70	.13
7	1.0	5.70	.13
8	1.0	6.70	.13
8	1.25	6.38	.16
9	1.0	7.70	.13
9	1.25	7.38	.16
10	1.5	8.05	.19
11	1.5	9.05	.19
12	1.5	10.05	.19
12	1.75	9.73	.22
14	2.0	11.40	.25
16	2.0	13.40	.25
18	2.5	14.75	.31
20	2.5	16.75	.31
22	2.5	18.75	.31
22	3.0	18.10	.38
24	3.0	20.10	.38
26	3.0	22.10	.38
27	3.0	23.10	.38
28	3.0	24.10	.38
30	3.5	25.45	.44
32	3.5	27.45	.44
33	3.5	28.45	.44
34	3.5	29.45	.44
36	4.0	30.80	.5
38	4.0	32.80	.5
39	4.0	33.80	.5
40	4.0	34.80	.5
42	4.5	36.15	.56
44	4.5	38.15	.56
45	4.5	39.15	.56
46	4.5	40.15	.56
48	5.0	41.51	.63
50	5.0	43.51	.63
52	5.0	45.51	.63

NOTE—This thread is largely used by Italian constructors.

Index to Tables and Data appears on Pages 23 to 25.

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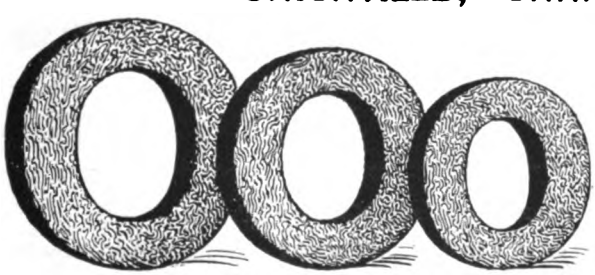

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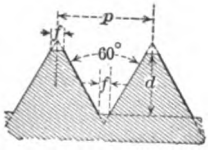
UNITED STATES 60° SCREW THREAD



Formula
$$\begin{cases} p = \text{pitch} = \dfrac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .6495 \\ f = \text{flat} = \dfrac{p}{8} \end{cases}$$

Diameter of Screw	Threads to Inch	Diameter at Root of Thread	Width of Flat
1/4	20	.185	.0063
5/16	18	.2403	.0069
3/8	16	.2936	.0078
7/16	14	.3447	.0089
1/2	13	.4001	.0096
9/16	12	.4542	.0104
5/8	11	.5069	.0114
3/4	10	.6201	.0125
7/8	9	.7307	.0139
1	8	.8376	.0156
1 1/8	7	.9394	.0179
1 1/4	7	1.0644	.0179
1 3/8	6	1.1585	.0208
1 1/2	6	1.2835	.0208
1 5/8	5 1/2	1.3888	.0227
1 3/4	5	1.4902	.0250
1 7/8	5	1.6152	.0250
2	4 1/2	1.7113	.0278
2 1/4	4 1/2	1.9613	.0278
2 1/2	4	2.1752	.0313
2 3/4	4	2.4252	.0313
3	3 1/2	2.6288	.0357
3 1/4	3 1/2	2.8788	.0357
3 1/2	3 1/4	3.1003	.0385
3 3/4	3	3.3170	.0417
4	3	3.5670	.0455
4 1/4	2 7/8	3.7982	.0455
4 1/2	2 3/4	4.0276	.0455
4 3/4	2 5/8	4.2551	.0476
5	2 1/2	4.4804	.0500
5 1/4	2 1/2	4.7304	.0500
5 1/2	2 3/8	4.9530	.0526
5 3/4	2 3/8	5.2030	.0526
6	2 1/4	5.4226	.0556

Standard Proportions for Machine Screws

The report of the committee on standard proportions for machine screws of the American Society of Mechanical Engineers is published in the October, 1906, proceedings of the society. The report is substantially in agreement with the recommendations adopted at the joint meeting held in New York, April 11, 1904.

The committee believes the following combined details to be essential in establishing and maintaining a standard for the diameters, threads and heads of machine screws, including, as it does, diameters, threads and limits for the taps which are to be used in connection therewith: (*a*) form of thread, (*b*) diameters, (*c*) number of threads per inch, (*d*) standard reference thread gauges, basic and for screws and taps, (*e*) working gauges for screws and taps, (*f*) limits of variation, measured in the angle of the thread, (*g*) limits of variation in external diameter, (*h*) limits of variation in the pitch of the thread screws and taps, (*i*) proportions of the heads.

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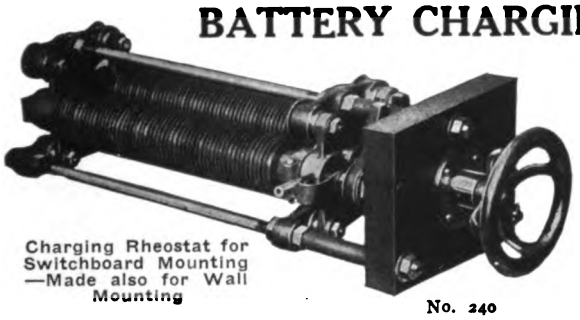
BATTERY CHARGING RHEOSTATS



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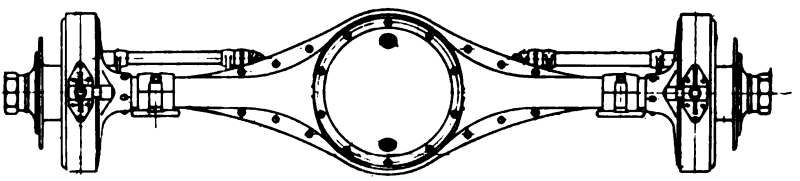

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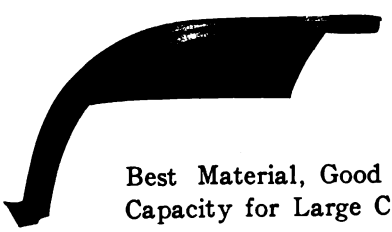

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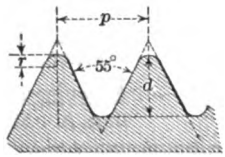
WHITWORTH STANDARD THREAD



Formula

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64933$$

$$r = \text{radius} = p \times .1373$$

Full Diameter	No. of Threads per Inch	Pitch	Standard Depth of Thread	Effective Diameter	Core Diameter	Cross Sectional Area at Bottom of Thread
¼ (.25)	20	.0500	.0320	.2180	.1860	.0272
5/16 (.3125)	18	.0556	.0356	.2769	.2414	.0458
⅜ (.375)	16	.0625	.0400	.3350	.2950	.0683
7/16 (.4375)	14	.0714	.0457	.3918	.3460	.0940
½ (.5)	12	.0833	.0534	.4466	.3933	.1215
9/16 (.5625)	12	.0833	.0534	.5091	.4558	.1632
⅝ (.625)	11	.0909	.0582	.5668	.5086	.2032
11/16 (.6875)	11	.0909	.0582	.6293	.5711	.2562
¾ (.75)	10	.1000	.0640	.6860	.6219	.3038
13/16 (.8125)	10	.1000	.0640	.7485	.6844	.3679
⅞ (.875)	9	.1111	.0711	.8039	.7327	.4216
1	8	.1250	.0800	.9200	.8399	.5540
1⅛ (1.125)	7	.1429	.0915	1.0335	.9420	.6969
1¼ (1.25)	7	.1429	.0915	1.1585	1.0670	.8942
1⅜ (1.375)	6	.1667	.1067	1.2683	1.1616	1.0597
1½ (1.5)	6	.1667	.1067	1.3933	1.2866	1.3001
1⅝ (1.625)	5	.2000	.1281	1.4969	1.3689	1.4718
1¾ (1.75)	5	.2000	.1281	1.6219	1.4939	1.7528
2	4½	.2222	.1423	1.8577	1.7154	2.3111
2¼ (2.25)	4	.2500	.1601	2.0899	1.9298	2.9249
2½ (2.5)	4	.2500	.1601	2.3399	2.1798	3.7318
2¾ (2.75)	3½	.2857	.1830	2.5670	2.3841	4.4641
3	3½	.2857	.1830	2.8170	2.6341	5.4496
3¼ (3.25)	3¼	.3077	.1970	3.0530	2.8560	6.4063
3½ (3.50)	3¼	.3077	.1970	3.3030	3.1060	7.5769
3¾ (3.75)	3	.3333	.2134	3.5366	3.231	8.6732
4	3	.3333	.2134	3.7866	3.5731	10.0272
4½ (4.50)	2⅞	.3478	.2227	4.2773	4.0546	12.9118
5	2¾	.3636	.2328	4.7672	4.5343	16.1477
5½ (5.50)	2⅝	.3810	.2439	5.2561	5.0121	19.7301
6	2½	.4000	.2561	5.7439	5.4877	23.6521

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DRILL SIZES FOR STANDARD THREADS

These sizes give an allowance above the bottom of thread on sizes 5/16 to 2; varying respectively as follows: for " V " Threads, .010" to .055"; for U. S. S. and Whitworth threads .005" to .027".

These are found by adding to the size at bottom of thread 1/4 of the pitch for " V " threads, and 1/8 of the pitch for U. S. S. and Whitworth, the pitch being equal to 1" ÷ No. of threads per 1".

In practice it is better to use a larger drill if the exact size called for cannot be had.

Size Screw	No. of Threads	Size of Drill			Size Screw	No. of Threads	Size of Drill		
		U. S. S.	" V "	W.			U. S. S.	" V "	W.
1/4	24	.201	.196	.202	15/16	9	.808	.790	.810
1/4	20	.191	.184	.192	1	8	.854	.832	.856
5/16	18	.248	.239	.249	1 1/16	8	.917	.894	.919
3/8	16	.302	.293	.303	1 1/8	7	.957	.932	.960
7/16	14	.354	.345	.355	1 1/4	7	1.082	1.057	1.085
1/2	13	.409	.399	.410	1 3/8	6	1.179	1.144	1.182
1/2	12	.402	.391	.403	1 1/2	6	1.304	1.269	1.307
9/16	12	.465	.453	.466	1 5/8	5 1/2	1.412	1.372	1.416
5/8	11	.518	.506	.520	1 5/8	5	1.390	1.347	1.394
11/16	11	.581	.568	.583	1 3/4	5	1.515	1.472	1.519
3/4	10	.632	.618	.634	1 7/8	5	1.640	1.597	1.644
13/16	10	.695	.680	.697	1 7/8	4 1/2	1.614	1.566	1.619
7/8	9	.745	.728	.747	2	4 1/2	1.739	1.691	1.744

DRILL SIZES FOR A. L. A. M. THREADS

The Following Tabulation Sets Forth the Size of Drill Used for A. L. A. M. Standard Taps, as Recommended by the Mechanical Branch

Size of Taps	Size of Drill	
	U. S. Standards	A. L. A. M. Standards
3/16 in. x 32 Threads	.....	5/32 in.
1/4 " x 28 "	13/64 in.	7/32 "
5/16 " x 24 "	1/4 "	17/64 "
3/8 " x 24 "	19/64 "	21/64 "
7/16 " x 20 "	11/32 "	3/8 "
1/2 " x 20 "	25/64 "	29/64 "
9/16 " x 18 "	29/64 "	1/2 "
5/8 " x 18 "	33/64 "	9/16 "
11/16 " x 16 "	37/64 "	39/64 "
3/4 " x 16 "	39/64 "	43/64 "
7/8 " x 14 "	47/64 "	25/32 "
1 " x 14 "	53/64 "	59/64 "

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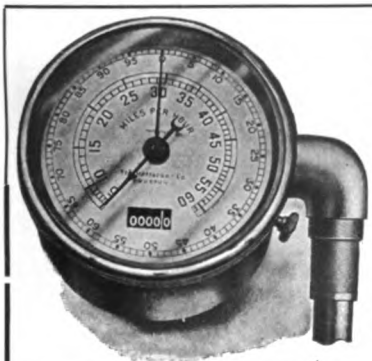

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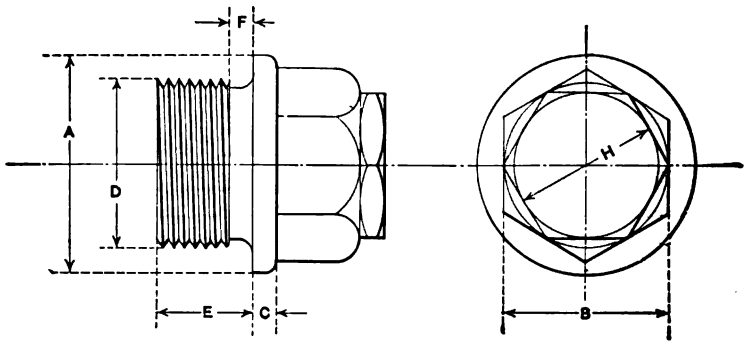
A. L. A. M. STANDARD SPARK PLUG

The spark plug adopted as a standard has a ⅞-inch diameter, straight thread, 18 pitch, and the design and dimensions shown in the following drawing and specifications:



A—One and one-eighth inch (1⅛″).

B—Seven-eighths inch (⅞″).

C—One-eighth inch (⅛″).

D—Seven-eighths inch (⅞″).

E—Not less than one-half inch (min. ½″).

F—Not more than one-eighth inch (max. ⅛″). (Depth of recess—not over depth of thread).

H—Three-quarters inch (¾″).

SPECIFICATIONS

STOCK—1⅛ inch round.

HEAD FORM—Milled Hex.
SHORT DIAMETER—⅞ inch.

FLANGE FORM—Circular.
DIAMETER—1⅛ inch.
THICKNESS—⅛ inch.
FACE—Annular seat ⅛ inch wide. (Suitable for McKim Type Copper-Asbestos Gasket.)

BLANK FOR THREAD—DIAMETER—⅞ inch.
LENGTH—Not less than ½ inch.

RECESS ADJACENT TO FLANGE—WIDTH—Not over ⅛ inch.
DEPTH—Not over depth of thread.

THREAD DIAMETER—⅞ inch straight.
PITCH—18.
FORM—U. S. Standard.
CUT—Perfect into recess.

PACKING-GLAND NUT HEAD—FORM—Hexagonal.
SHORT DIAMETER—¾ inch.

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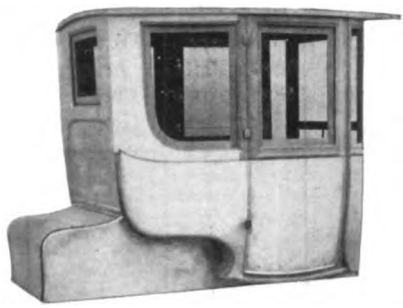

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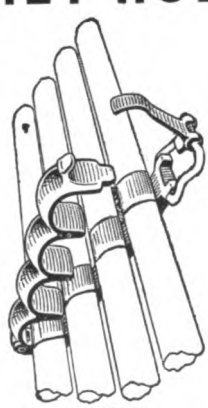

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DIMENSIONS OF SQUARE AND HEXAGON BOLT HEADS AND SIZE OF STOCK REQUIRED

UNITED STATES STANDARD SIZES

Diameter	Distance Across Flats, Square and Hexagon	Distance Across Corners, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	1/2	9/16	1/4	1 9/32	1 3/32	1/4
3/8	11/16	25/32	11/32	1 1/2	1 1/4	3/8
1/2	7/8	1	7/16	1 23/32	1 1/2	1/2
5/8	1 1/16	1 7/32	17/32	2	1 11/16	5/8
3/4	1 1/4	1 7/16	5/8	2 7/32	1 15/16	3/4
7/8	1 7/16	1 21/32	21/32	2 1/2	2 5/32	7/8
1	1 5/8	1 7/8	13/16	2 3/4	2 3/8	1
1 1/8	1 13/16	2 3/32	29/32	3	2 19/32	1 1/8
1 1/4	2	2 5/16	1	3 1/4	2 27/32	1 1/4
1 3/8	2 3/16	2 1/2	1 3/32	3 9/16	3	1 3/8
1 1/2	2 3/8	2 3/4	1 3/16	3 13/16	3 5/16	1 1/2
1 5/8	2 9/16	2 15/16	1 9/32	4 1/16	3 1/2	1 5/8
1 3/4	2 3/4	3 3/16	1 3/8	4 3/8	3 3/4	1 3/4
1 7/8	2 15/16	3 13/32	1 15/32	4 5/8	4	1 7/8
2	3 1/8	3 5/8	1 9/16	4 7/8	4 1/4	2
2 1/4	3 1/2	4 1/16	1 3/4	5 7/16	4 25/32	2 1/4
2 1/2	3 7/8	4 1/2	1 15/16	5 15/16	5 3/16	2 1/2
2 3/4	4 1/4	4 7/8	2 1/8	6 7/16	5 1/2	2 3/4
3	4 5/8	5 11/32	2 5/16	7	6 1/16	3

MANUFACTURERS' STANDARD SIZES

Diameter	Distance Across Flats, Square	Distance Across Flats, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	3/8	7/16	3/16	17/32	23/32	1/4
3/8	9/16	5/8	9/32	13/16	15/16	3/8
1/2	3/4	13/16	3/8	1 1/16	1 3/32	1/2
5/8	15/16	1	15/32	1 11/32	1 13/32	5/8
3/4	1 1/8	1 3/16	9/16	1 5/8	1 9/16	3/4
7/8	1 5/16	1 3/8	21/32	1 7/8	1 7/8	7/8
1	1 1/2	1 9/16	3/4	2 5/32	2 1/32	1
1 1/8	1 11/16	1 3/4	27/32	2 13/32	2 7/32	1 1/8
1 1/4	1 7/8	1 15/16	15/16	2 11/16	2 7/16	1 1/4
1 3/8	2 1/16	2 1/8	1 1/16	3 1/32	2 27/32	1 3/8
1 1/2	2 1/4	2 5/16	1 1/8	3 7/32	3	1 1/2
1 5/8	2 7/16	2 1/2	1 1/4	3 19/32	3 1/4	1 5/8
1 3/4	2 5/8	2 11/16	1 5/16	3 3/4	3 15/32	1 3/4
1 7/8	2 13/16	2 7/8	1 7/16	4 3/32	3 23/32	1 7/8
2	3	3 1/16	1 1/2	4 5/16	4	2
2 1/4	3 3/8	3 7/16	1 3/4	5	4 9/16	2 1/4
2 1/2	3 3/4	3 13/16	1 7/8	5 3/8	4 13/16	2 1/2
2 3/4	4 1/8	4 3/16	2 1/16	5 29/32	5 3/8	2 3/4
3	4 1/2	4 9/16	2 1/4	6 7/16	5 11/16	3

Index to Tables and Data appears on Pages 23 to 25.

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"The Elliott Auto-Lighter"

Consists of:

An Automatic Valve Opener,
which turns on and lights acetylene lamps from the seat.

A Regulating Valve,
which adjusts and controls the flame at proper height.

Two Indestructible Single Hole Burners,
which give full efficiency and consume one-third less gas.

A High Grade Single Unit Spark Coil,
which makes the output independent of regular ignition system,
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All
operated from the regular ignition storage battery.

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A simple and practical device, attached to the burner stem of headlight, by means of which the gas can be ignited by simply pulling a knob. No opening of lamp doors, no match, electricity or flame of any sort required.

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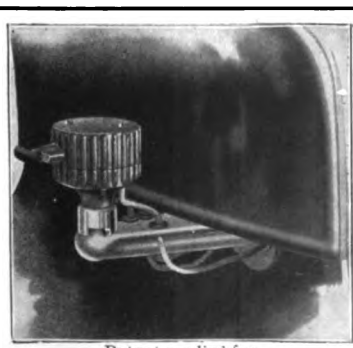

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Simplest in Construction	Best in Results	Cheapest in Price Only

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PRICE, $7.00

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UNITED STATES STANDARD BOLTS AND NUTS

Diameter of Bolt Inches	Area at Bottom of Thread	Tensile Strength at 10,000 Pounds per Square Inch	Threads per Inch	Thickness of Head.	Thickness of Nut	Short Diameter Square or Hexagon Head or Nut	Long Diameter Square Head or Nut	Long Diameter Hexagon Head or Nut	Weight Each Square Nut	Weight Each Hexagon Nut	Weight per 100 Square Nuts	Weight per 100 Hexagon Nuts	Weight per Inch Length of Bolt
1/4	.0269	269	20	1/4	1/4	1/2	11/16	9/16	.0138	.0131	1.38	1.31	.0136
5/16	.0454	454	18	19/64	5/16	19/32	13/16	11/16	.0231	.0192	2.31	1.92	.0213
3/8	.0678	678	16	11/32	3/8	11/16	1	13/16	.0426	.0333	4.26	3.33	.0306
7/16	.0933	933	14	25/64	7/16	25/32	1 1/8	7/8	.0613	.0500	6.13	5.00	.0417
1/2	.1257	1,257	13	7/16	1/2	7/8	1 1/4	1	.0893	.0700	8.93	7.00	.0545
5/8	.2018	2,018	11	17/32	5/8	1 1/16	1 1/2	1 1/4	.1560	.1350	15.60	13.50	.0852
3/4	.3020	3,020	10	5/8	3/4	1 1/4	1 3/4	1 7/16	.2630	.2220	26.30	22.20	.1227
7/8	.4193	4,193	9	23/32	7/8	1 7/16	2 1/16	1 11/16	.3570	.3240	35.70	32.40	.1670
1	.5510	5,510	8	13/16	1	1 5/8	2 5/16	1 7/8	.5880	.4630	58.80	46.30	.2181
1 1/8	.6931	6,931	7	29/32	1 1/8	1 13/16	2 9/16	2 1/16	.7690	.6760	76.90	67.60	.2760
1 1/4	.8899	8,899	7	1	1 1/4	2	2 13/16	2 5/16	1.04	.9010	104	90.10	.3410
1 3/8	1.0541	10,541	6	1 3/32	1 3/8	2 3/16	3 1/8	2 1/2	1.43	1.18	143	118	.4120
1 1/2	1.2938	12,938	6	1 3/16	1 1/2	2 3/8	3 3/8	2 3/4	1.72	1.47	172	147	.4900
1 3/4	1.7441	17,441	5	1 3/8	1 3/4	2 3/4	3 7/8	3 3/16	2.94	2.50	294	250	.6680
2	2.3001	23,001	4 1/2	1 9/16	2	3 1/8	4 7/16	3 5/8	4.35	3.45	435	345	.8720

TABLE OF RIVETS IN 100 POUNDS
APPROXIMATE NUMBER

Length Rivets	Diameter of Rivets											
	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	11/16	3/4	7/8	1
1/2	17500	15900	8000	5100	3200	1900	.....	.....	.....	.....	.....	....
5/8	16000	13800	7000	4500	2900	1800	.....	.....	.....	.....	.....	....
3/4	14400	12200	6300	4100	2373	1476	1103	642	.....	.....	.....	....
7/8	13500	10900	5700	3700	2190	1371	1030	604	.....	.....	.....	....
1	12600	9800	5200	3400	2034	1280	968	571	400	345	.....	....
1 1/8	11600	9000	4700	3100	1898	1200	910	541	382	322	208	....
1 1/4	10800	8300	4400	2900	1780	1129	862	514	365	311	206	....
1 3/8	10000	7600	4100	2700	1675	1056	815	489	350	295	204	....
1 1/2	9300	7100	4000	2500	1582	1010	776	462	335	284	201	....
1 5/8	8700	.....	3800	2300	1498	960	740	446	324	275	199	132
1 3/4	8100	6300	3500	2200	1424	914	707	428	311	266	192	128
1 7/8	.....	.....	3400	2000	1356	872	672	411	302	257	185	124
2	.....	5600	3000	1900	1295	834	648	395	293	249	178	120
2 1/8	.....	.....	.....	.....	1238	800	623	381	285	240	172	116
2 1/4	.....	5000	2800	1800	1187	768	599	367	277	233	167	112
2 3/8	.....	.....	.....	.....	1139	738	577	354	269	226	162	108
2 1/2	.....	4600	2500	1700	1095	711	556	343	261	219	157	104
2 5/8	.....	.....	.....	.....	1052	687	537	332	253	212	152	100
2 3/4	.....	4200	2300	1500	1017	662	519	321	245	206	148	96
2 7/8	.....	.....	.....	.....	982	636	503	311	237	201	144	92
3	.....	3900	2200	1400	949	611	487	302	230	196	140	88

Index to Tables and Data appears on Pages 23 to 25.

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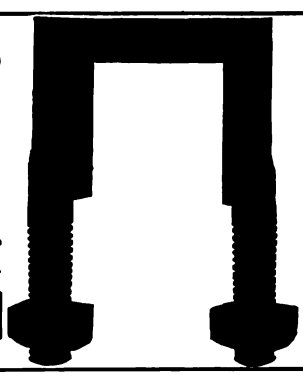
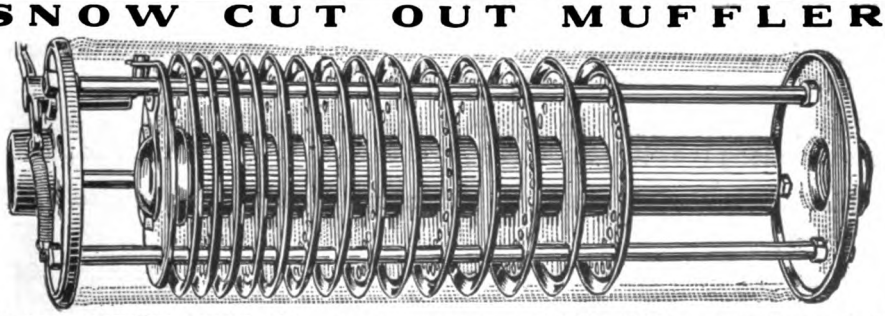


SNOW CUT OUT MUFFLER



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DIMENSIONS OF STANDARD WEIGHT WROUGHT-IRON PIPE

1¼ and smaller proved to 300 pounds per square inch by hydraulic pressure.
1½ and larger proved to 500 pounds per square inch by hydraulic pressure.

Inside diameter.	Actual Outside Diameter.	Thickness.	Actual Inside Diameter.	Inside Circumference.	Outside Circumference.	Length of Pipe per square foot of inside surface.	Length of Pipe per square foot of outside surface.	Inside Area.	Outside Area.	Length of Pipe containing one cubic foot.	Weight per foot.	No. of Threads per inch of screw.	Taper of threads per inch of screw.
Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ft.*	*Ft.*	*Ins.*	*Ins.*	*Ft.*	*Lbs.*		*In.*
⅛	0.405	0.068	0.270	0.848	1.272	14.15	9.44	0.0572	0.129	2500.	0.243	27	1/32
¼	.54	.088	.364	1.144	1.696	10.50	7.075	.1041	.229	1385.	.422	18	1/32
⅜	.675	.091	.494	1.552	2.121	7.67	5.657	.1916	.358	751.5	.561	18	1/32
½	.84	.109	.623	1.957	2.652	6.13	4.502	.3048	.554	472.4	.845	14	1/32
¾	1.05	.113	.824	2.589	3.299	4.635	3.637	.5333	.866	270.	1.126	14	1/32
1	1.315	.134	1.048	3.292	4.134	3.679	2.903	.8627	1.357	166.9	1.670	11½	1/32
1¼	1.66	.140	1.380	4.335	5.215	2.768	2.301	1.496	2.164	96.25	2.258	11½	1/32
1½	1.90	.145	1.611	5.061	5.969	2.371	2.01	2.038	2.835	70.65	2.694	11½	1/32
2	2.375	.154	2.067	6.494	7.461	1.848	1.611	3.355	4.430	42.36	3.600	11½	1/32
2½	2.875	.204	2.468	7.754	9.032	1.547	1.328	4.783	6.491	30.11	5.773	8	1/32
3	3.50	.217	3.067	9.636	10.996	1.245	1.091	7.388	9.621	19.49	7.547	8	1/32

SIZING AND CUTTING OF GEAR WHEELS

The word "diameter," when applied to gears, is always understood to mean the pitch diameter.

Diametral pitch of the gear is the number of teeth to each inch of its pitch diameter.

If a gear has 40 teeth and the pitch diameter is 4 inches there are ten teeth to each inch of the pitch diameter, and the diametral pitch is 10, or in other words the gear is 10 diametral pitch.

Circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

If the distance from the center of one tooth to the center of next tooth, measured along the pitch circle, is ½ inch the gear is ½ inch circular pitch.

The diametral pitch given, to obtain the circular pitch divide 3.1416 by the diametral pitch.

If the diametral pitch is 4 divide 3.1416 by 4, and the quotient, .7854 inch is the circular pitcn.

(Continued on page 758)

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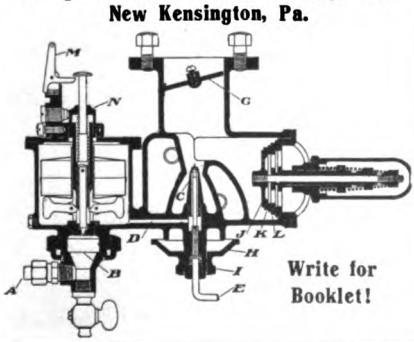

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The circular pitch given, to obtain the diametral pitch divide 3.1416 by the circular pitch.

If the circular pitch is 2 inches, divide 3.1416 by 2, and the quotient, 1.5708, is the diametral pitch.

The number of teeth and the diametral pitch given, to obtain the pitch diameter divide the number of teeth by the diametral pitch.

If the number of teeth is 40 and the diametral pitch 4 divide 40 by 4, and the quotient, 10, is the pitch diameter.

The number of teeth and the diametral pitch given, to obtain the whole diameter or size of blank of gear add 2 to the number of teeth and divide by the diametral pitch.

If the number of teeth is 40 and the diametral pitch is 4 add 2 to the 40, making 42, and divide by 4; the quotient, 10½ is the whole diameter of the gear or blank.

The number of teeth and the diameter of the blank given, to obtain the diametral pitch add 2 to the number of teeth and divide by the diameter of the blank.

If the number of teeth is 40, and the diameter of the blank is 10½ inches, add 2 to the number of teeth, making 42, and divide by 10½; the quotient, 4, is the diametral pitch.

The pitch diameter and the diametral pitch given, to obtain the number of teeth multiply the pitch diameter by the diametral pitch.

If the diameter of the pitch circle is 10 inches and the diametral pitch is 4 multiply 10 by 4, and the product, 40, will be the number of teeth in the gear.

The whole diameter of the blank and the diametral pitch given, to obtain the number of teeth in the gear multiply the diameter by the diametral pitch and subtract 2.

If the whole diameter is 10½ and the diametral pitch is 4 multiply 10½ by 4 and the product, 42 less 2, or 40, is the number of teeth.

The thickness of a tooth at the pitch line is found by dividing the circular pitch by 2, or divide 1.57 by the diametral pitch.

If the circular pitch is 1.047 inches, or the diametral pitch is 3, divide 1.047 by 2 or 1.57 by 3, and the quotient, .523 inch, is the thickness of the tooth.

The whole depth of a tooth is found by dividing 2.157 by the diametral pitch.

If the diametral pitch of a gear is 6, the whole depth is 2.157 divided by 6, equals .3595.

The whole depth of a tooth is about 11-16, or exactly .6866 of the circular pitch.

If the circular pitch is 2 the whole depth of tooth is about 11-16 of 2 inches, or 1⅜ inches nearly.

The distance between the centers of two gears is found by adding the number of teeth together and dividing half the sum by the diametral pitch.

If two gears have 50 and 30 teeth, respectively, and are 5 pitch, add 50 and 30, making 80, divide by 2, and then divide the quotient, 40, by the diametral pitch, 5, and the result, 8 inches, is the center distance.

Index to Tables and Data appears on Pages 23 to 25.

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—every one an expert, and

WE HAVE THE DISPOSITION
—to build automobile engines from whatever designs are furnished us—blueprints or specifications—as well as such engines can be built, and

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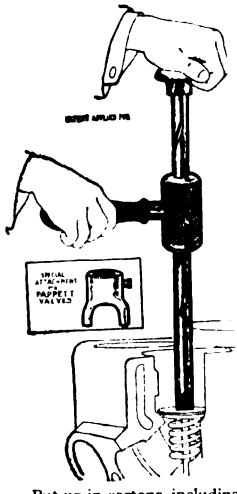

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The position must be changed frequently to obtain uniformity of the bearing.

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RULES ADOPTED BY THE CONTEST BOARD OF THE AMERICAN AUTOMOBILE ASSOCIATION

Approved by the Board of Directors of the American Automobile Association and by the General Rules Committee of the Manufacturers' Contest Association, February 1, 1911

GENERAL RULES.

The following rules shall be known as the Contest Rules of the American Automobile Association, and shall govern all contests held under its sanction.

It shall be assumed that every entrant and driver is acquainted with these rules, and the entrant, by his signature to his entry blank, and the driver shall agree to be bound by them, and by any modifications of them approved by the Contest Board.

Any contestant who is ineligible to compete in contests under the rules of the International Association of Recognized Automobile Clubs is ineligible for any contest under these rules, and vice versa.

POWERS OF THE CONTEST BOARD.

1. **Powers of the Contest Board.**—The Contest Board of the American Automobile Association shall have the right to make and construe rules for and render decisions concerning all forms of automobile contests; to grant, refuse, or withdraw sanctions; to grant, refuse, or withdraw track licenses; to grant, refuse, or withdraw registrations to automobile drivers; to assign dates for and to promote contests; to veto the appointment of any race official; to inquire into and deal with all matters relating to contests subject to the rules; to disqualify, either temporarily or permanently, persons guilty of infraction of the rules; to reinstate persons so disqualified; to determine who are and who are not eligible to compete; to interpret these rules, and generally to do any and all things in connection with contests which, in its judgment, are conducive to their well being and are not inconsistent with the rules.

The Contest Board shall have an Official Representative at each contest.

2. **Contest Board's Decision Final.**—In the event of any point arising under or which is not covered by these rules, the Contest Board shall have the power to decide upon the same, and its decision shall be final.

DEFINITIONS.

3. The following shall be the official definitions of terms used in these rules:

Amateur.—A man who has never driven or raced a motor car for pay, either in cash or any other valuable consideration, such as traveling, hotel or other expenses in connection with a contest; competed for a cash prize; who does not make his livelihood, or any part of it, as a result of racing or driving, either as a demonstrator, tester, or chauffeur; who has not otherwise received financial reward for engaging in competition; who is not actively engaged in the automobile or accessory industries; who has not since January 1, 1911, competed against a professional in a track or road race; who has never been declared a professional by any sport-governing body, in connection with that sport over which it has jurisdiction, or who, having been so declared, has been reinstated, either by such body or in connection with automobile contests by the Contest Board of the A. A. A.

Affiliated Club.—Any local club which is a member of the Association.

Association.—The American Automobile Association.

Automobile, Motor Car or Car.—A four-wheeled vehicle propelled by self-contained mechanical means, fitted with at least two brakes operated independently of each other and a motor-driven reversing mechanism.

Beach Race.—A race conducted on a natural or specially prepared beach.

Contest.—Any competition in which motor cars participate.

Contest Board.—The Contest Board of the American Automobile Association.

Driver.—A man named by an entrant as the driver of a competing car.

Entrant, Contestant or Competitor.—Any man or organization which makes an entry of a motor car for a contest.

Fuel.—The fuel or substance used in contests for the generation of power must be unadulterated. No agent of oxidization other than atmospheric air will be permitted.

Miniature Tonneau.—A car provided with a miniature tonneau with door or doors, and seats for at least four adults, two in front and two or more in the tonneau.

(Continued on following pages)

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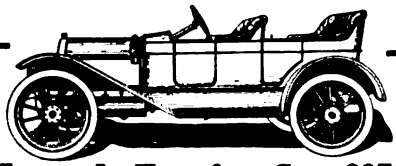

Torpedo Touring Car, $975

A Car for Everyone to Own. The

Paige-Detroit

Trade Mark

4-Cylinder, 4-Cycle, 25 H. P.

Guaranteed for One Year. Repair Parts at Cost
Either Two or Four Cycle Motor Furnished

IMPORTANT	PAIGE - DETROIT PRICES
SPECIFICATIONS **Wheel Base** Touring Car, 104 inches. Roadster, 90 inches. **Motor** 4-cycle, 4-cylinder. Full 25 H. P. Bore, 3¾ inches. Stroke, 4 inches. **Ignition** Bosch magneto. **Tire Equipment** 32x3½ in., Touring Car. 32x3 in., Roadster.	Roadster (standard equipment), $800. Roadster with full equipment, $875. Touring Car with removable rear seats (standard equipment), $900. Top and Wind Shield Extra Fore-Door, Torpedo Type, Touring Car (standard equipment), $975. Coupe, full electric light equipment, $1,250.

Paige-Detroit Motor Car Co.
300-310 21st St. Detroit, Mich.

The Apperson-Lee Motor Co.
612 Main Street
LYNCHBURG, VIRGINIA

Southern Distributors for Palmer-Singer Automobiles

Agents for Virginia and North Carolina for Haynes Automobiles

Garage and Supplies

Where Else Can Yon Get Lion Features at Lion Prices?

Stop and think a moment and you'll begin to realize that the **Lion "40"** has no real competition. No one else can sell you for such prices a car which has **40 H. P. Motor, 4½" Bore, 5" Stroke, 36" Wheels, 112" Wheel Base,** but this company or its authorized agents.

LION "40" "Runs Like Sixty"

PRICES:

Gentlemen's Roadster	$1450	5-Passenger Touring Car	$1500
4-Passenger Baby Tonneau	1475	Fore-Door 5-Passenger Touring Car	1600

(All fully equipped with Mohair Top and Wind Shield) F. O. B. Factory, Adrian, Michigan

The Lion Motor Sales Company, 668 Woodward Ave., Detroit, Michigan
General Sales Agents for U. S. and Canada
Let us send our catalog and our special agency proposition

AGAIN WE SAY

We have the most liberal agency proposition ever offered in the whole history of the automobile. We have proved this statement to hundreds of others, we can prove it to you. Here is your chance to make big money. We are specializing in the manufacture of light commercial cars. Six models of commercial cars ranging in price from $650 to $1500. Seven models of pleasure cars ranging in price from $1100 to $2000. Fill in coupon, request our catalog, and mail to us today.

Maytag-Mason Motor Company
Waterloo, Iowa

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Passenger.—Any occupant, other than the driver, of a competing car.

Promoter.—Any person or organization who or which organizes a contest.

Racing Car.—Any motor car specially built for contests.

Records.—A National Record is a record unequalled in the United States or its colonies.

A World's Record is a record unequalled in any other part of the world.

Road Race.—A race conducted entirely or principally over public or private highways.

Runabout or Tourabout.—A car provided with seats for two persons side by side in front and, at the option of the entrant, one or two seats, without tonneau, for one or two persons in the rear.

Sanction.—A permit from the Contest Board to conduct a contest under these rules.

Technical Committee.—The Technical Committee of the Contest Board.

Touring Car.—A car provided with a tonneau and seats for at least five adults, two in front and three or more in the tonneau.

Track Race.—A contest conducted on a track which conforms with these rules.

STOCK CAR.

Stock Car.—A motor car which complies with each and all of the following requirements:

1. **Certificate of Description.**—A complete description of the car upon the official blank* provided for the purpose must be filed with the Technical Committee of the Contest Board at least thirty (30) days prior to the first contest in which the car shall compete.

2. **Registration Number.**—No Certificate of Description of a stock car or chassis filed with the Contest Board shall be valid until the maker shall have received notification of its acceptance with the assignment of a registration number by the Contest Board. The fee for registration of each model shall be $50.00 to M. C. A. members, and $100.00 to non-members of M. C. A.

3. **Car on Sale.**—The car must be or have been on sale through all the regular selling representatives of the manufacturer during the period of its production.

4. **Manufacturers' Annual Output.**—The manufacturer's annual output shall include his total production of all models, excluding taxicabs, delivery wagons or other vehicles designed for commercial use.

5. **Quantity Production of Model.**—The quantity production of any model must bear to the total annual output of its manufacturer the ratio set forth in the following table based upon a period of time from July 1st to June 30th of the following year:

Total Annual Output All Models.	Percentage of Same Model.
10,000 cars or more	4.5%
8,000 cars to 9,999	5.0%
6,000 cars to 7,999	6.0%
4,000 cars to 5,999	7.0%
2,000 cars to 3,999	8.0%
1,000 cars to 1,999	9.0%
500 cars to 999	10.0%
250 cars to 499	16.0%
100 cars to 249	30.0%
50 cars to 99	50.0%

6. **Percentage of Output.**—The required percentage of output of any model shall in every case be in accordance with the table in Paragraph 5. Percentages are calculated on actual total annual output.

7. **Minimum of 25 Cars.—Whatever may be the number of cars of the same model necessary to constitute the percentage called for by the foregoing table in Paragraph 5, at least twenty-five (25) of such cars must have first been built before such model is entitled to a stock rating.**

8. **Bodies on Same Chassis.**—The use of different bodies—touring car, miniature tonneau, runabout, etc., upon the same chassis shall not constitute a difference of model under the meaning of this definition, but cars thus equipped must be entered in the respective classes to which the body equipment renders them eligible. Miniature tonneaus, surreys, double or single rumbles shall, for the purpose of these rules, be considered runabouts.

9. **Foreign-built Cars.**—In determining the stock status of a foreign-built car, the total number of such cars imported into this country shall be taken instead of the total output of the foreign factory, and the number of any particular model necessary to constitute it a stock model shall be determined by the ratio set forth in the foregoing table in Paragraph 5; in other words, the intent of this rule is to place the importer of foreign cars on the same basis as the American manufacturer.

*Official blanks for Stock Car Description may be obtained from the Chairman of the Contest Board, 437 Fifth Ave., New York City.

Index to Tables and Data appears on Pages 23 to 25.

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The Cleveland Speed and Time Indicator

MODEL A
for pleasure vehicles

MODEL B
for gasoline and electric commercial vehicles

MODEL E
for electric pleasure vehicles

A Stop Watch on Your Car

The application of the escapement principle of the clock, combining the two elements—time and distance—marks a distinct advance in speedometer construction.

The time feature is characteristic and distinctive of the Cleveland instruments. This feature showing the actual running time consumed in the car's operation is the best evidence of the car's efficiency, for the instruments show at all times the distance travelled as well as the actual running time, and the operation is not affected by any change in temperature.

A new descriptive catalogue shows the complete line and will be forwarded upon request.

The Cleveland Speed Indicator Co.
1806 Euclid Ave., Cleveland, O.

—you can prove it by your watch

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10. **Car Must Correspond to Registration.**—The cars entered in any contest must absolutely correspond to the detailed description contained in the Certificate of Description; otherwise they shall not be permitted to start in the contest, and entry fee paid shall be forfeited to the promoter.

STRIPPED STOCK CHASSIS.

Stripped Stock Chassis.—"A motor car chassis which, except for the options listed below, can, by adding the necessary parts, be assembled into a complete stock car." (See "Stock Car" definition.)

Options Permitted.

Lighter Springs (number of leaves optional; thickness, width and length must be standard).

Piston Diameters may be lessened (form of rings and number of oil grooves, etc., must be standard).

Angle of Steering Post.

Length and Angle of change gear, brake and other control levers (method of control must be standard).

Driving Gear ratio, *wheel diameters excepted.* (Where a gear ratio is changed on a shaft driven car, any gear ratio may be used of which the standard axle construction will permit.)

Tire and Rim Equipment.

Length of clutch, brake, accelerator and other pedals.

Body Equipment: Contour of dash, seat and body optional, but floor boards must be carried. (See Dash Requirements.)

Form, Volume and Location of Fuel and Oil Tanks (system employed in either case must remain unchanged).

Exhaust header and exhaust pipe (optional, except exhaust must be conducted outside the bonnet and so directed as not to raise dust. See Rule 69).

Use of Shock Absorbers.

Winding of Springs only (winding of manifolds, fuel and water pipes or electrical connections must be standard).

Bonnets must be carried throughout a contest, but may be cut away at the side for the passage of exhaust pipes only. (See Rule 70.)

Bonnet straps must be added and approved by the Technical Committee.

Special Wheel Fenders or radiator protectors of any design may be used, *wind shields excepted*, provided they are attached to the car in a manner satisfactory to the Technical Committee.

Note on Lubrication.—Where a reserve oil supply is provided, a pipe connection with hand-pump may be employed to transfer the lubricant to the standard oil receptacle regularly supplied by the manufacturer with the car, but in no instance will it be permitted to connect a reserve oil supply directly with the parts to be lubricated unless such connection may be the standard lubrication equipment under the "stock" definition.

Dash Requirements.—In a stripped stock chassis the contour of the dash outside of the limits of the bonnet is optional, but the dash arrangements within the limits of the bonnet contour must be in accordance with the regular stock model; standard stock car dash equipment must be carried thereon and it shall not be cut away for the passage of air or for access to the working parts of the motor in any way which does not conform to the regular stock model.

Additional Parts to Chassis.—Dash, seat, body, tank or other permissible equipment shall be of substantial and safe construction within the approval of the Technical Committee of the Contest Board.

4. **Bona Fide Status of Stock Car.**—It is the intention of the rules relating to stock car and stock chassis competitions that such competitions shall be restricted to those cars identical in specification, materials and design with the manufacturer's product which is manufactured in quantity and is offered for sale and sold in a bona fide manner to the public through the regular selling agencies of the manufacturer.

5. **Evasion of Stock Car Definition.**—In the event of evasion on the part of entrants of the spirit of the "stock car" or "stock chassis" definition concerning points not definitely stated in these rules, the Contest Board shall have full power to render such decision as it may deem for the welfare of the sport and industry.

6. **Technical Committee of the Contest Board.**—It shall be the duty of the Technical Committee of the Contest Board to pass upon, establish and certify to the Contest Board the stock status of all manufacturers' models offered for registration with the Contest Board as stock cars and stock chassis.

In any case where it may be necessary to establish the status of any car alleged to be a stock car under the definition contained in these rules, the Committee shall have the right to visit the factory of the manufacturer of such car, who shall be required to submit to the Committee such evidence as it may require to verify the allegation on which the "stock" status of the car is based.

The decision of the Technical Committee shall be final as regards the eligibility of any car to enter or start in any contest held under the Contest Rules of the A. A. A.

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4 Cylinders 5¾ x 4¾. 124 in. Wheel Base, 36 in. Wheels, completely equipped, as shown in cut, $3,500

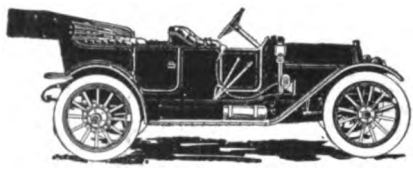
Cunningham

Long Stroke Motor,—Unit Power Plant,—Chrome Nickel Gears,—Large Valves,—Perfectly Balanced Spring Suspension. Powerful, Silent, Reliable and Accessible

We say without fear of the comparison that the Cunningham will acquit itself most favorably in contrast with America's best cars, and in many features will be found to contain original and practical ideas in design tending to minimize cost of operation and maintenance not found in others.

We have been several years developing this car, determined to build it as good as a car can possibly be built.

James Cunningham, Son & Co.
Desk F, 18 Canal Street, Rochester
New York, U. S. A.
Whiting Motor Co., Sales Agents,
1802 Broadway, New York
Responsible and Established Dealers
Write for Open Territory



HALLADAY "40"

FORE DOOR

14 Models, $1100 to $2650

Limousines **Landaulets**
Torpedoes **Touring Cars**
Toy Tonneaus and Roadsters

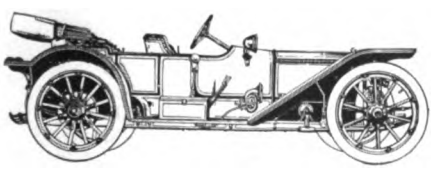
Some Territory Open.

Live dealers, write for our agency proposition.

STREATOR MOTOR CAR CO.
Streator, Ill.

THE AMERICAN

A Car for the Discriminating Few



THE TRAVELER

Underslung Frame

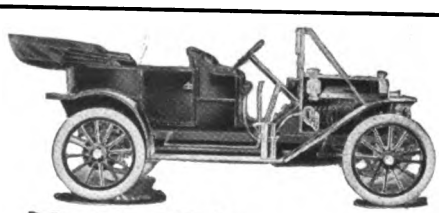
40-inch Wheels; 4 Cylinders; 50 H.P.

$4,250

The American is a car of special class which superbly realizes the scientific principles underlying complete security, amazing speed and mechanical efficiency.

We are adding a limited number of representatives to our sales organization. Wire or write for territory now.

AMERICAN MOTORS COMPANY
Members A. L. A. M.
Desk 7 **Indianapolis, Ind.**



Moline

"THE CAR TO SELL"

DEALERS find it easier to sell a car that has won widespread

Popularity The winning of the Chicago Trophy in the recent **Glidden Tour** has set everyone talking about the 1911 Moline. Everyone wants to see the car which made such a wonderful record.

Merit Every feature of the 1911 Moline is of tested and proven worth.

Best Value Positively the highest class cars ever offered for the price. Dealers will find not only profit but satisfaction in selling the 1911 Moline.

Write quick for territory and terms.

MOLINE AUTOMOBILE CO.
44 Keokuk Street, EAST MOLINE, ILL.

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No car which the Technical Committee has ruled as ineligible shall be allowed to start in any contest, under protest or otherwise, and the decision of the Technical Committee thereon shall not be subject to appeal to the Contest Board.

The Technical Committee of the Contest Board shall serve as the Technical Committee for all National events; they shall, during the running of a speed contest, have general supervision and control of the pits and shall have the power to hold for repairs at the pits any car which they consider to be in an unsafe condition, but they shall report such fact to the Referee, who shall order the car held.

No Class "A" or Class "B" events shall be run in any contest unless a member or representative of the Technical Committee is present.

The Technical Committee of the Contest Board shall as far as possible have a representative present at every contest held under A. A. A. sanction.

The Technical Committee shall also have power to take possession of any competing car either before or after the finish of any contest and make such examination thereof as may be necessary to establish its "stock" status.

CLASSIFICATION.

Class "A."

Stock Cars—Price Classification:

7. **Class "A."**—Open to any gasoline motor car (other than motor cars with solid tires, wheels 36 inches in diameter and over) which complies with the definition "stock car," this class to be run in the following divisions:

Division 1A	$800 and under.
Division 2A	801 to $1,200
Division 3A	1,201 to 1,600
Division 4A	1,601 to 2,000
Division 5A	2,001 to 3,000
Division 6A	3,001 to 4,000
Division 7A	4,000 and over.

Extra or optional equipment, listed in the manufacturer's Certificate of Description as such, used upon a car competing under price classification, must have its list price added to the list price of the car, and this total price shall determine the classification of the car. No extra equipment shall be permitted other than that listed as such in the manufacturer's Certificate of Description.

No car shall compete in any division above that to which its price entitles it.

Class "B."

Stock Chassis—Minimum Weight and Piston Displacement Classification:

Class "B."—Open to any chassis of a gasoline car which is in accordance with the definition of a "stock chassis;" to be governed by the following table of piston displacement and minimum chassis weights:

Division.	Piston Displacement in cubic inches.	Minimum weight in pounds.
1B	160 and under	900
2B	161 to 230	1200
3B	231 to 300	1500
4B	301 to 450	1800
5B	451 to 600	2100
6B	601 to 750	2400

No car shall compete in any division above that to which its weight entitles it.

No dead weight of any description shall be added to a car or attached thereto in any manner as ballast.

The use of any additional weight to bring a car into a class above that to which its weight entitles it will be considered an evasion of the rules.

Class "C."

Non-Stock—Piston Displacement (only) Classification:

Class "C."—Open to any gasoline car or chassis made by a factory which has during the twelve months prior to the date of contest produced at least 50 motor cars (not necessarily of the same model). Eligible for entry under the piston displacement limitations of Class "B," but without minimum weight restrictions.

Division.	Piston Displacement in cubic inches.
1C	160 and under.
2C	161 to 230
3C	231 to 300
4C	301 to 450
5C	451 to 600
6C	601 to 750

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NO matter what is *claimed* for a magneto, its only *value* as part of a motor car is its *efficiency* and *durability* in *service*. There are no *claims*, no *limited* trials, no *conditional* guarantees attached to the

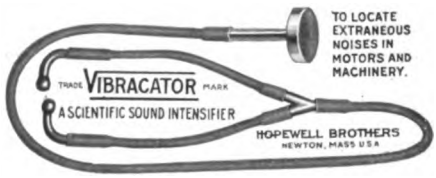
BRIGGS MAGNETO

It is *always* on trial. "Every owner of a motor car equipped with a Briggs Magneto and Coil is guaranteed a perfect working ignition system until the car itself goes to the scrap heap." That is quoted from our guarantee given with every Magneto. No "ifs," "ands" or "buts"—or "loopholes." Booklet free on request.

BRIGGS MANUFACTURING CO.
ELKHART, INDIANA

VIBRACATOR

A Scientific Sound Intensifier



THIS INSTRUMENT LOCATES ENGINE KNOCKS OR VIBRATIONS IN MACHINERY.

DO NOT TAKE YOUR MACHINE TO PIECES TO FIND YOUR TROUBLE, BUT USE A VIBRACATOR AND LOCATE IT AT ONCE.

Designed by an engineer and constructed on scientific principles. Especially valuable to garages and repair shops. **Price, $2.50 prepaid.**

MANUFACTURED BY

Hopewell Brothers
29 Chapel St.
NEWTON, - MASS.

"CUYAHOGA" STORAGE BATTERIES

For Electric Pleasure Vehicles, Trucks, and Electric Launches. Ignition and Lighting of Automobiles, Yachts and Motor Boats

Are the Best Ever Made

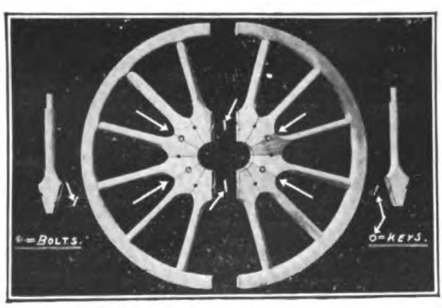
On Vehicle Batteries we guarantee 25% greater capacity than any other make of lead battery on the market. Our "Cuyahoga" Ignition and Lighting Batteries are guaranteed for two years against anything but accident or abuse.
Prices are low to quantity buyers. Made by

LAWRENCE STORAGE BATTERY CO., - Cleveland, Ohio

Defiance Keyed Artillery Wheels

Patented June 21, 1910, No. 962207

THEY CAN'T SQUEAK



Now in use on many of the best cars in the country.

If you want something better than ordinary wheels let us hear from you.

The Turnbull Wagon Co.
DEFIANCE, OHIO

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No car shall compete in any division above that to which its piston displacement entitles it.

Class "D."

Non-Stock—Free-for-All:

Class "D."—Open to any gasoline car which complies with the definition of a "motor car" without restriction as to piston displacement, weight, price, or quantity produced. There may not be more than two events under Class "D" upon a day's program without special permission of the Contest Board.

Class "E."

Special Events:

Class "E."—Special events other than those above specified held in connection with any motor car meet or contest, and approved by the Contest Board, of which there may not be more than three upon a day's program without special permission of the Contest Board.

Class "F."—Open to gasoline "stock cars" of the high-wheeled, solid tired buggy type, diameter of wheels 36 inches or over. Entries subject to price limitations of Class "A." There may not be more than two events under Class "F" upon a day's program without special permission of the Contest Board.

Class "G."—Open to electric "stock cars" only. Subject to the price limitations of Class "A."

Class "H."—Open to commercial cars, cabs and trucks. Division limitations to be obtained from the Contest Board.

8. **Match Races.**—Matches may be held as contests of any kind covered by any of these rules, and may be run under any of the classes or divisions.

WEIGHING REQUIREMENTS.

9. **Minimum Weight Requirements.**—A car under minimum weight classification must weigh in without operator, passengers, fuel, lubricants (other than those contained in the crank case of the motor, in the transmission gear box and in the rear axle), water, tools, spare tires, luggage, clothing, provisions, lamps and horn. At time of weighing, car must be equipped with the lightest tire equipment to be used in the contest. Shock absorbers and batteries shall not be removed, provided they are to be carried throughout the contest.

10. **Ballast Not Allowed.**—No dead weight of any description shall be added to a car under minimum weight classification, or attached thereto in any manner, as ballast.

11. **Scale Test.**—In contests under weight classification the promoter shall furnish the Referee with a certificate of verification of the scales used to weigh the car, which certificate the Referee shall forward to the Contest Board with his report of the contest.

No car shall be permitted to empty tanks or remove parts at any point within 200 feet of the scales platform.

SANCTIONS.

12. **Application for Sanction.**—A promoter shall not advertise an event as sanctioned by the A. A. A. until such sanction has been actually issued. (See Rule 23A.)

A promoter desiring to hold a contest shall make application for a sanction thirty (30) days in advance thereof (except as hereinafter provided in Rules 102 and 207) upon a form to be supplied by the Contest Board, which form shall read as follows:

To S. M. BUTLER,

Chairman Contest Board, American Automobile Association,
437 Fifth Ave., New York City.

Enclosed please find.....Dollars ($.....)
in payment for official sanction to conduct a.....
contest to be held under the rules of the Contest Board of the American Automobile Association (approved by the Manufacturers' Contest Association) and under the obligation to include the text of the official A. A. A. entry blank in the body of any entry blank used in connection with this contest.

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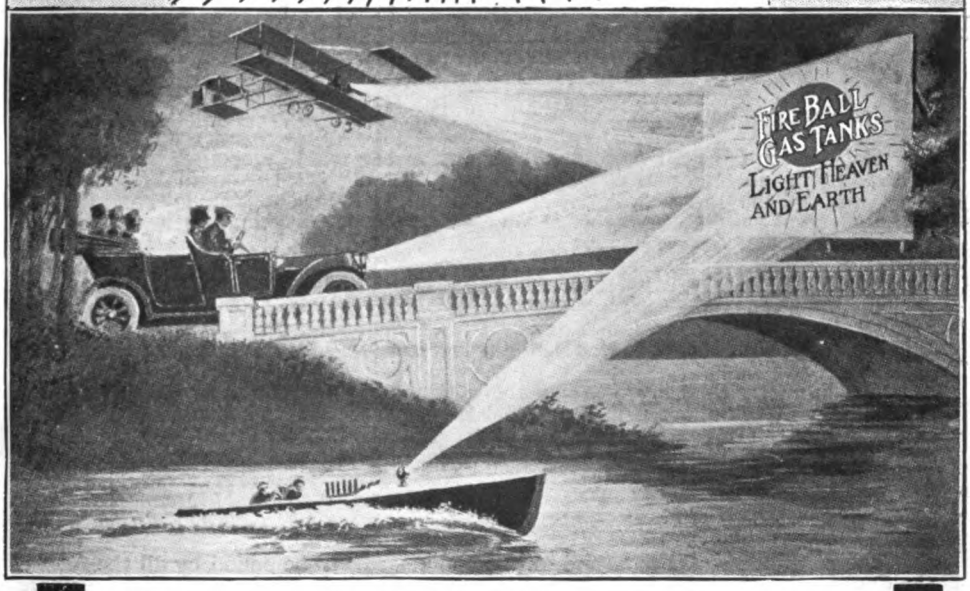
FIRE-BALL GAS TANKS



"The Tank of Quality and Quantity"

Constructed of Drawn Cartridge Brass, Highly Polished

Greater Gas Capacity **More Light Hours**
Charged with Purified Acetylene Gas
Giving a Pure White Light of Intense Brilliancy
Requires no Key to Control Gas Flow
Nor Wrench or Tools to Attach or Detach
Lighter in Weight **Elegant in Appearance**

Write for Booklet and Full Details

Fireball Gas Tank & Illuminating Co.

5010 DELMAR BOULEVARD, ST. LOUIS, U. S. A.

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Following are the details of the above contest:
Name of Promoter.....
P. O. Address.....
Date or dates of contest.....
Place where contest will be held.....
If road race or hill climb, date of permit for use of road.....
If track, date of license by Contest Board.....
Changes in track, if any, since date of license.....

EVENT			Amount of Entry Fee.	PRIZES.	
Class.	Division.	Distance.		Description.	Value.

(For additional events use back of blank.)
Prizes shall be in cash or plate.

Date of closing of entries.....
(Must be at least 5 days in advance of contest.)

No sanction fee shall be returned for any reason whatsoever after a sanction has been granted. In the event of a postponement of a contest, the original fee shall hold good provided the Contest Board shall within twenty-four hours, Sundays and holidays excepted, be at once advised of and shall approve the postponed date selected.

Name of Referee.....
Names of Timers.....
Method of Timing.....

In "stock car" and "stock chassis" events (Classes "A" and "B"), cars to be eligible to compete must be registered with and conform to the official description on file with the Contest Board. A list of registered stock cars will be supplied to the promoter upon application.

The promoter shall agree to pay the expenses of officials and of investigations of the course or track above named and all other such legitimate expenses in connection with the sanction or contest as may be incurred by the Contest Board.

Representative of A. A. A. Technical Committee.....
Representative of Contest Board.....

This name to be filled in by the Contest Board of the A. A. A., and his services at $10.00 per diem in addition to his railroad and hotel expenses must be paid by the applicant for this sanction.

The promoter by his signature to this blank agrees to be bound by all the rules of the Contest Board of the A. A. A. and agrees to submit for their approval any supplementary regulations desired in connection with the contest.

Date.....Signature of Promoter.....
.....

Detach and retain this stub, filling in the blank spaces and mailing to the Contest Board not later than ten (10) days prior to the start of the event.

Official Sanction No.....

To S. M. BUTLER,
Chairman Contest Board, American Automobile Association,
437 Fifth Ave., New York City.

The following officials have been selected for the.....
contest to be conducted by.....on.....
(date)

Judges.....
.....
Other officials.....
.....
.....
.....
.....
The course has been surveyed and attested to by.....
.....
Date.....Signature of Promoter.....

Index to Tables and Data appears on Pages 23 to 25.

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Light Lamps from the Driver's Seat

You can reach from your seat, just turn a switch on the dash and light all or part of your lamps as you need them if you have the Duplex System, and you get *better light at less* cost—no odor or smoke—no bother like cleaning and charging oil or gas lamps. It is absolutely safe, simple, dependable, efficient and long lived.

The Duplex System

The duplex system utilizes a dynamo, battery and current regulator. The dynamo can be placed anywhere in the car, adjacent to a shaft. It is operated by belt, chain or gear drive from shaft. A storage battery stores up the current generated while the car is in motion, by means of a small generator. An Automatic circuit breaker does away with any danger of overcharging and automatically maintain the proper amount of current in the battery, so the lights burn steadily and brightly.

Whether you own a car or sell cars or motor supplies, you ought to know all about the duplex system. We have *special agency proposition* to responsible dealers only. Write us a postal for folder NOW while it's on your mind.

THE DUPLEX ELECTRIC COMPANY

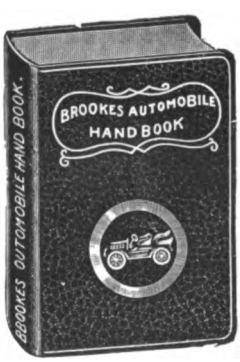
13 McWilliams Street, : : : Fond du Lac, Wisconsin

The AUTOMOBILE HAND-BOOK

By

I. Elliott Brookes

470 pages and over 180 illustrations. New 1909 enlarged edition. Popular edition, full leather limp, $1.50, postpaid.



A work of practical information for the use of Owners, Operators and Automobile Mechanics, giving full and concise information on all questions relating to the construction, care and operation of gasoline and electric automobiles, including Road Troubles, Motor Troubles, Carbureter Troubles, Ignition Troubles, Battery Troubles, Clutch Troubles, Starting Troubles. With numerous tables, useful rules and formulas, wiring diagrams and over 180 illustrations.

The Class Journal Company

231-241 W. 39th St. : : : : New York

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13. **Certified Trials.**—Any automobile or accessory manufacturer, agent or dealer who desires to make any special form of road trail of his individual car, or of an accessory, under official supervision, observation and certification may, upon application to the Contest Board, secure an official sanction for such trial. All such trials shall be carried on under the General Rules, and special regulations for certified trials to be supplied by the Contest Board.

The fees for such trials will be arranged by the Contest Board in accordance with the character and length of the trials.

14. **Fees.**—An application for a sanction must be accompanied by a sanction fee in amount as shown by the following table:

For race or speed trials on the road, in connection with which a grand stand is used	$300
For race or speed trials on the road, without a grand stand	100
For track meeting or speed trials, each day	100
For races or speed trials on beach, each day	100
For two-day track meeting, including a 24-hour event	250
For specially constructed speedways, each day	150
For hill-climbing contest	50
For reliability, endurance, economy or touring contest	50

Any affiliated club or association, except speedway corporation, shall be entitled to a reduction of 50% from the above fees provided such club or association shall have been a member in good standing of the A. A. A. for at least ninety days prior to the date of application for sanction.

15. **Referee and Other Officials.**—The Referee for every contest shall be appointed by the Contest Board. In applying for a sanction the promoter must recommend a person or persons to the Contest Board for such appointment, and the promoter shall not less than ten (10) days prior to the contest file, upon a form supplied by the Contest Board, a list of the other officials of the contest, such officials to be acceptable to the Referee.

16. **Expenses.**—The promoter shall agree to pay the expenses of officials and of investigations of courses and tracks hereinafter referred to and all other such legitimate expenses in connection with the sanction or contest as may be incurred by the Contest Board.

17. **Reserved Territory.**—No sanction shall be granted to any promoters to hold a contest in the territory of an affiliated club until the Contest Board has conferred with such club.

18. **Disbarment of Promoter.**—No sanction shall be granted to a promoter who shall have previously transgressed the contest rules of the American Automobile Association, or permitted their transgression at a meeting under his or its management, until such promoter shall have been restored to good standing by formal action of the Contest Board.

19. **No Return of Fee.**—No sanction fee shall be returned for any reason whatsoever after a sanction has been granted. In the event of a postponement of a contest, the original fee shall hold good provided the Contest Board shall, within twenty-four hours, Sundays and holidays excepted, be advised of and shall approve the postponed date selected.

20. **Changes in Details.**—After a sanction has been granted no change shall be made in any of the details set forth therein or in the application except with the approval of the Contest Board, and in no case after the date set for the closing of entries. Notices of approved changes shall be mailed by the promoter to each entrant.

21. **Postponement and Abandonment.**—After the receipt of entries no contest shall be abandoned without the consent of the Contest Board, except that on the day of the race the Referee may order a postponement (See Rule 44.) Notice of postponement shall be mailed by the promoter to each entrant. (See Rule 34.)

DUTIES OF PROMOTERS.

22. **Entry Blank.**—As soon as practicable after the filing of his application for sanction, the promoter shall draft an entry blank, in accordance with such application incorporating in every detail the verbiage of the official form of entry blank furnished by the Contest Board, which is as follows:

Index to Tables and Data appears on Pages 23 to 25.

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AUTO PARTS MFG. CO. DETROIT MICH.

HOW WE SERVE THE CAR BUILDER

In machinery facilities and mechanical skill, men's brains and hands, we are particularly well equipped to be of assistance to the automobile manufacturer.

Especially is this true of experimental work in the changing of designs, or the working out in metal of new ideas, as set down in blue prints.

Our shops are equipped to supply parts, in large or small quantities, for most cars.

In addition to this we are prepared to build cars to order, incorporating individual ideas or on our own designs.

Auto Parts Manufacturing Co.
DEPARTMENT D DETROIT, MICH.

The Jordan DEMOUNTABLE RIM

An advance over every previous type of demountable rim—superior in simplicity of design and ease of adjustment, in service ability and in final economy.

There is no complicating locking mechanism, no bolts or nuts. A simple little hand lever does it all. Unlocks as easily as unlocking a door.

Tires can be easily changed in ten seconds. Can be used with any clincher or Q. D. rim or tires.

The Jordan Demountable Rim is not an experiment, but an improvement of conceded efficiency. Practical service has demonstrated its superiority to all others in every essential.

Absolutely the best appearing rim made.

Price per Set $125.00

Write for further information.

JORDAN DEMOUNTABLE RIM CO.
733 Boylston St. BOSTON, MASS.

THE Jenkins EMERGENCY WHEEL TRADE MARK

"Does the work of other devices at one-fifth the cost." And there's money in it for you, Mr. Dealer and Mr. Jobber.

Jenkins Emergency Wheel Co., Inc.
Richmond :: VIRGINIA

LIGHTEST — The scales prove it.
STRONGEST — Immune to frost and vibration.
MOST EFFICIENT — Proven so on test.

Give us an opportunity to figure on your requirements.

THE HARRISON RADIATOR CO.
LOCKPORT, N. Y.

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Official Sanction No......

Form of Official Entry Blank.

.....**Contest**
Conducted by.....
at.....**on**.....
(date of contest)

Under the Rules and with the Sanction of the Contest Board of the American Automobile Association (approved by the Manufacturers' Contest Association).

To.....
(name of promoter) (date line)
.....
(address)

Enclosed please find.....**Dollars**.
($.....) **in payment for entry fee for one car in**..
Event No......**Class**.....**Division**.....
Name of Car.....
A. A. A. Registered Stock Car No......
Manufactured by.....
Manufacturer's Model and Year.....
Manufacturer's No. of Motor.....
Manufacturer's No. of Chassis.....
Minimum Weight.....
Motive Power.....
(gasoline, steam or electric)
Bore.....**Stroke**.....**Number of Cylinders**.....
Total Piston Displacement.....**Cubic Inches**
Passenger Capacity, style of car and body.....
Name of Owner.....
Address.....
Name of Driver.....
Driver's Register No......

The attention of entrants is especially called to Rule No. 75 of the Contest Rules of the A. A. A. regarding advertising, and any infraction of said rule shall be reported by the Referee to the Contest Board.

A description of the prizes and awards to be given in this contest is incorporated as a part of this entry blank.

I hereby agree to furnish any other data regarding the car above entered that may be required by the promoter or Technical Committee.

I make this entry subject to all the rules of the Contest Board and the examination of the Technical Committee of the A. A. A.

Signature of Entrant.....
P. O. Address.....
Make checks payable to.....
Entries close.....
If Reliability Contest, give name and address of Observer.....
.....

A separate blank must be used for each car entered.

Details of Prizes and Awards.....
.....

23. **Forwarding Entry Blank.—A copy of such draft of entry blank shall immediately upon its preparation be forwarded to the Chairman of the Contest Board for approval.**

23a. **Issuance of Sanction.**—Upon approval of the proposed entry blank submitted by the promoter, a sanction number will be assigned and Official Sanction Grant will be issued. The promoter shall then print said approved entry blank and distribute to prospective entrants.

No sanction will be issued until the receipt and approval by the Contest Board of the promoter's entry blank.

24. **Acknowledging Entries.**—The promoter must duly acknowledge receipt of an entry and fee.

25. **Forwarding Entries.**—Immediately on closing of entries, a complete list of entrants, drivers and cars must be forwarded to the Chairman of the Contest Board, upon the official blank provided for that purpose.

A failure to comply with this rule may subject the promoter to disqualification for further sanctions.

26. **Program Requirements.**—If the promoter prints a program, it shall bear upon its face the words: "Under the rules and with the sanction of the Contest Board of The American Automobile Association." It shall set forth:

The number of the official sanction.

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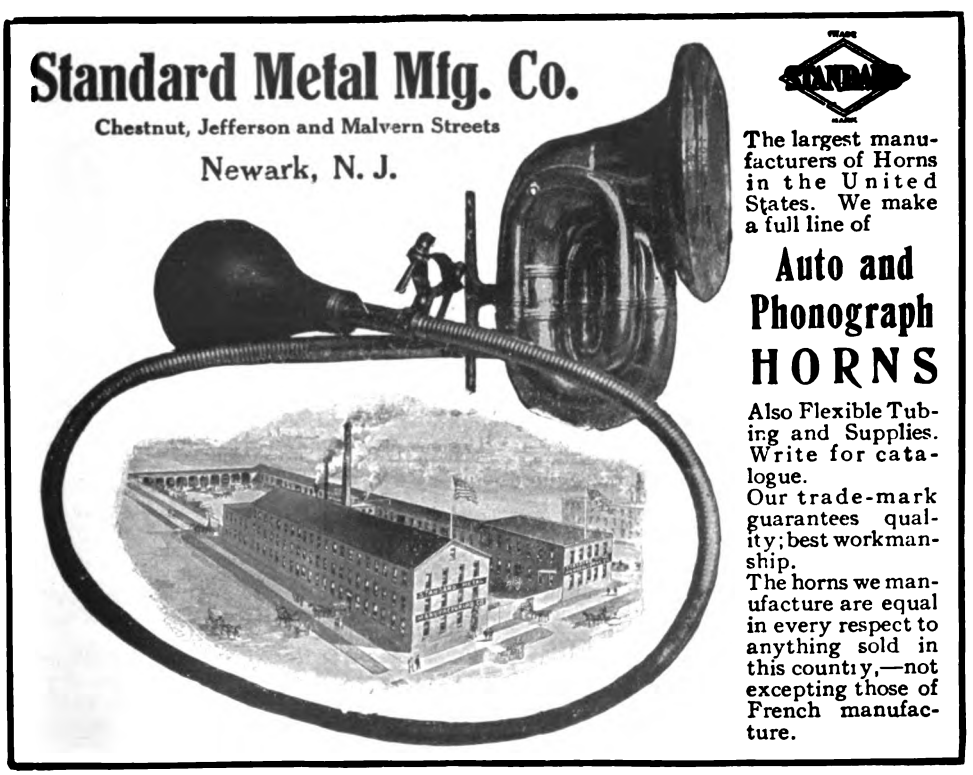

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A schedule of the events with the cars entered (with manufacturer's model and year), the drivers, and numbers in each event.

A heading over each event on the program designating it plainly as a "stock" or "non-stock" event, as follows: "This race for registered Stock Cars (or Stock Chassis)," or "This race for Non-Stock Class C Cars," or "This race for Non-Stock Free-for-All Cars."

A description of the prizes.

A copy of the rule relative to the classification of automobiles for the contest or contests.

The manner of starting.

A list of the names of officials conducting the contest, and of the representative of the Contest Board.

The time at which each event is schedued to take place.

26a. **Score Board Requirements.**—The promoter of any speed contest on road track or speedway shall provide a suitable score board or boards, giving the program number of the event, name of car and driver and distance of race, and shall display conspicuously thereon over each event the program designation provided for in Rule 26, in order that spectators may be fully advised as to whether the race is for "stock" or "non-stock" cars.

OFFICIAL REPORTS.

27. **Official Report of Meeting.**—Within three days of the completion of the meeting, the Official Representative of the Contest Board and the Referee shall each forward to the Chairman of the Contest Board a statement that the prizes have been awarded; also a complete record of the contest, showing the list of entrants, starters and final standing of competitors in each event, the time made and other details by which the event was decided; also copy of the official program. These records shall be signed by the Referee, Judges and Timers.

ENTRIES.

28. **Entries in Writing.**—Entries shall be made in writing exclusively on the forms provided by the promoter. (See Rule No. 22.)

A promoter who advertises a contestant as entered for any contest until such entry shall have been actually received shall be subject to disqualification.

29. **Entry Fees.**—A promoter shall be permitted to charge an entry fee of not to exceed ten per cent. (10%) of the actual value of the first prize offered in each event, except in case of trophies which have been competed for at least once prior to the year 1910; but at the option of the promoter the entry fee in no case need be less than five dollars ($5.00). The amount of entry fee for each event shall be stated in the promoter's application for sanction (Rule No. 12) and shall in each case be subject to the approval of the Contest Board.

30. **Eligible Competitors.**—Entries shall be accepted only from persons who have not since the first day of January, 1909, taken part in any contest not sanctioned by the American Automobile Association; who have never since that date competed or allowed their cars to compete with a person not eligible under the rules and rulings of the Contest Board; who agree by their signatures to the prescribed entry blank to recognize the jurisdiction and decisions of the Contest Board, and who have not been debarred from competition in automobile events over which the Contest Board or the governing bodies of other nations have jurisdiction, or, having been so debarred, have been reinstated either by the American Automobile Association or such other governing body as is herein referred to. The driver must be a person who is eligible as an entrant.

31. **Reciprocal International Disqualification.**—By mutual agreement with the Automobile Club of America, the American representative of the International Association of Recognized Automobile Clubs, any contestant who is ineligible to compete in contests under the rules of such International Governing Body is ineligible for any contest under these rules, and vice versa.

32. **Stock Car Eligibility.**—No car shall be permitted to compete in any "stock car" or "stock chassis" (Class "A" or "B") contest unless the required certificate of description (see "Stock Car" Definition) shall have been on file in the main office of the Contest Board for at least thirty days prior to the date of the contest.

No car shall be permitted to compete in Classes "A" or "B" until it has been registered by the Contest Board.

33. **Combination of Driver and Car.**—An entry shall consist of a combination of driver and car. No change of car, or of driver, shall be permitted after the date of closing of entries, except with the consent of the Referee.

34. **Closing of Entries.**—Entries shall close not less than five days in advance of the date set for the contest, except by consent of the Contest Board. In case of postponement, which must be sanctioned by the Referee, entries may be reopened, but shall finally close not less than 24 hours prior to the first day of the contest, but in such event any entrant may, immediately the postponement is announced, but not otherwise,

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STAND ALMOST WITHOUT COMPETITION

Price $1.00
Made in all sizes.
Mica or Porcelain.
Interchangeable.

For when you compare the service obtained by the use of

Auburn Ignition Plugs

with the service rendered by other plugs—then, and then only, do the real merits of Auburn Ignition Plugs become apparent.

On the basis of dollar for dollar you'll get more life and wear, less trouble and worry from Auburn Ignition Plugs than from any other plug made. The reason for this is that our facilities to make plugs and our years of experience enable us to make better plugs.

Do not confuse our plugs with others similarly named, but manufactured by another concern. To be sure of the genuine, look on every porcelain and on every hexagonal nut for the words

AUBURN IGNITION

Do this for your own good and economy.

LOOK FOR THE NAME

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Made in all sizes.
Mica only.

THE AUBURN IGNITION SPARK PLUG

The Auburn Ignition Mfg. Co.

Dept. L. **Auburn, N. Y.**

MANUFACTURERS OF

SPARK PLUGS, TIMERS, DISTRIBUTORS, SHOCK ABSORBERS AND AUTOMOBILE POWER TIRE PUMPS

WRITE FOR CIRCULARS AND PRICES

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withdraw his entry and shall be entitled to a return of his entry fee. In case of abandonment of an event, all entry fees shall be returned.

35. **Revised Entry List to be Published.**—Where a contest is postponed and added entries are received, the promoter shall cause to be published a revised list of entrants, including those so added.

36. **Acceptance of Entry.**—No entry shall be accepted after midnight of the day set for the closing of entries, and no entry shall be accepted unless accompanied by the entry fee and all of the details required as set forth in the entry blank. Acceptance of an entry under any other conditions shall be a sufficient reason for the refusal of a subsequent sanction to the offending promoter.

37. **Entering Two or More Cars.**—An entrant who enters more than one car for an event shall at the time of the entry supply full details concerning each car, using separate blanks for each car entered.

37a. **Cars of Same Make—Three Entries Only.**—Not more than three cars of any one make shall be entered in any one division.

REGISTRATION OF DRIVERS.

38. **Racing Drivers' Register.**—All drivers shall be required to register annually with the Contest Board, at its main office in New York, which registration shall expire on December 31st of each year.

The fee for such registration shall be Two Dollars, and shall accompany the application.

Registration blanks may be obtained from the Contest Board, or from its official representatives, and shall be filled out and signed by the applicant.

The registration cards issued by the Contest Board must be shown to the Referee on demand at any meeting.

39. **Unregistered Driver May Not Compete.**—No driver will be allowed to compete in any sanctioned event unless he has registered as required by Rule 38, and is in good standing.

40. **Amateur Drivers' Register.**—Amateur drivers shall be required to register annually with the Contest Board at its main office in New York, which registration shall expire on December 31st of each year.

The fee for such registration shall be Two Dollars, and shall accompany the application.

Registration blanks may be obtained from the Contest Board, or from its official representatives, and shall be filled out by the applicant as follows:

a. Name and address.

b. Profession or occupation.

c. Declaration that applicant is not actively engaged in the automobile or accessory industries, is eligible under the "Amateur" Definition in these rules, and has never violated any of its provisions.

The registration cards issued by the Contest Board must be shown to the Referee on demand at any meeting.

40a. **Amateurs and Professionals.**—Amateur drivers shall not compete in track or road races against professional drivers; in the event of their so doing they shall lose their amateur standing.

41. **Unregistered Amateur May Not Compete.**—No amateur may compete in any sanctioned racing event unless he has registered as required by Rule 40 and his amateur status has not changed since the date of his registration.

42. **Amateur Entries.**—An amateur shall neither enter for nor drive in any contest a motor car which is the property of a person, persons or corporation actively engaged in the automobile or accessory industries.

OFFICIALS.

43. **No Competitor as Official.**—No competitor or representative of a competitor shall be appointed to any official position.

44. **Referee.**—The principal officer of a contest shall be a Referee, who, in the absence of the official representative of the Contest Board, shall exercise general supervision over the contest and act as the Contest Board's representative.

(a) He shall, if necessary, instruct all other officials as to these rules.

(b) He shall receive all protests and render decisions thereon, subject to appeal to the Contest Board, as hereinafter provided.

(c) He shall report to the Contest Board the facts in connection with any protest which is sustained. When a protest is not sustained, he shall forward the forfeited deposit (see Rule 54) to the Contest Board, together with his report.

(d) It shall be his duty to enforce the rules, and make a full report to the Chairman of the Contest Board of any transgressions thereof, either by promoter, contestants or officials.

(e) After one or more cars shall have finished a contest, the Referee may call the race at an end.

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THE ECONOMY CAR

44,607 Maxwells are in use to-day. 44,607 owners have styled the Maxwell the Economy Car. Maxwell is not only economical in operation, but in first cost. The first cost entails a smaller outlay in proportion to value than any other car in the market.

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Model AB	—2 cylinder, 16 horsepower, Including top, generator and gas lamps,	$ 600
Model Q-11	—4 cylinder, 22 horsepower, runabout,	750
Model Q- 3	—4 cylinder, 22 horsepower, 4-passenger touring car,	800
Model I-	- 4 cylinder, 25 horsepower, 4-passenger touring car,	950
Model EA	—4 cylinder, 30 horsepower, 5-passenger touring car,	1400
Model GA	—4 cylinder, 30 horsepower, 4-passenger touring car,	1400
Model GA	—4 cylinder, 30 horsepower, 2-passenger roadster,	1400

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243-249 WEST THIRTY-NINTH STREET NEW YORK, N. Y.

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(f) He may in his discretion place and enforce a time limit.

(g) He may require any driver to demonstrate his ability to properly handle the car in which he intends to compete.

(h) He may disqualify any driver, mechanic, entrant or entrant's representative who shows discourtesy toward any official.

(i) He shall have power to prohibit the starting of any car which he considers unsafe, unsuitable or of improper construction, and of any driver who is unable to satisfy him as to his ability to safely handle the car.

(j) He shall prohibit any driver or mechanic from entering or continuing in a race who in his opinion is physically unfit.

(k) He shall cause the withdrawal of any car, either in practice or during a contest which, in his opinion, is unsafe, until it is put in a condition satisfactory to him and disqualify and cause the withdrawal of any driver or passenger who, in his opinion, infringes any rule of the contest.

(l) He shall disqualify any competitor, with or without a protest, who is guilty of an infraction of the rules.

(m) He shall suspend and replace any official who, in his opinion, fails to satisfactorily perform his duty.

(n) He shall cause the withdrawal from the contest of any employe or attendant of any entrant who, in his opinion, is guilty of unseemly conduct.

(o) He shall have the power to excuse competitors who present reasons, satisfactory in his judgment, for failure to start, but shall report unsatisfactory cases to the Contest Board.

(p) He may, in the event of a protest relative to any matter which shall affect the right of a car to start, unless it be possible to render an immediate decision, allow the car to start, and render his decision as soon after the event as may be possible.

(q) He may order a postponement of an event in case of inclement weather, or in case the course is not, in his opinion, in condition to permit the event to be safely conducted, or for any reason which, in his judgment—after consultation with the promoter or representative of the Contest Board—may be valid.

(r) He shall have the right to stop a race before its scheduled termination if emergency demand such action, and in such a case no award shall be made.

(s) He shall forward a report of the contest within three (3) days of its completion; failure to observe this rule shall disqualify him from acting as an official at any subsequent contest unless reinstated by the Contest Board.

45. **Promoter's Technical Committee.**—There shall be for every contest a Technical Committee, consisting of the representative of the A. A. A. Technical Committee for the district in which the contest is held, and such other members as the promoter may appoint. It shall be the duty of this Committee to examine the cars before the contest and report their findings to the Referee; they shall also examine the cars after the contest and at any time during the running of the contest that may be necessary.

46. **Representative of Contest Board.**—The official representative of the Contest Board, in attendance at any event in his territory, shall be entitled to a fee of ten dollars per diem in addition to hotel and railroad expenses, and shall see that the contest is conducted in accordance with these rules and make a report thereon to the Contest Board.

47. **Other Officials.**—There shall be, in addition to the Referee, such other officials as are hereinafter prescribed and whose duties are set forth under the special rules governing the various forms of contests.

PRIZES.

48. **Cash or Plate.**—Prizes may be in cash or plate, and a winning competitor in any event in which cash is offered may require the promoter to substitute plate to the full value of the cash offered.

49. **Responsibility for Prizes.**—Any club or organization which associates itself in any way, wholly or partially, with the promotion of a contest shall become responsible for the delivery of the prizes as stated on the entry blank, and for the enforcement of the rules of the Contest Board. The Contest Board may require a promoter to furnish proof that the prizes will be forthcoming and require the amount of prize money, or the value of plate offered, or the plate itself to be deposited subject to the order of the Referee or representative of the Contest Board.

50. **Delivery of Prizes.**—No prizes shall be delivered until twenty-four hours have elapsed, and, in the event of a protest, or appeal to the Contest Board from the decision of the Referee, the prizes shall be withheld pending a final decision.

50A. Any contest which for any reason is called off before its scheduled termination and no car has covered the entire distance of the course shall be declared "No race," and no prize award shall be made.

50B. **Bond for Return of Trophy.**—In any contest where the prize award is a trophy to be temporarily held by the winner thereof, the promoter may require such winner to furnish a bond for the return of such trophy, but in no case shall the amount of such bond exceed the actual money cost of said trophy

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Ever Circularize?

May be you have had experience with incomplete and obsolete lists, if so, you will appreciate the thorough and up-to-date listing of the trade as exemplified by THE AUTOMOBILE TRADE DIRECTORY'S MAILING LIST.

This List is acknowledged to be the only complete work of its kind in existence, and one in great demand among manufacturers, who "follow up" their advertising through the mails.

You can secure a copy for your own use—a letter of request will bring the details.

The Automobile Trade Directory

243-49 West 39th Street
NEW YORK, - N. Y.

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PROTESTS.

51. **Protests.**—Each protest shall be in writing and shall be signed by the protesting entrant, his authorized agent or driver, and shall be lodged with the Referee within the time hereinafter prescribed.

52. **Withdrawal of Protest.**—A protest shall not be withdrawn without the consent of the Referee.

53. **Time of Protest.**—(a) A protest relative to classification, validity of entry, or pertaining to the course shall be made such time before the start of the contest as the Referee may determine and announce to competitors.

(b) A protest against any decision of technical inspectors shall be made within three hours after decision has been announced.

(c) Other Protests.—A protest as to infraction of the rules or in relation to any other matter occurring during the running of a contest shall be made within twenty-four hours after the completion of the contest, Sundays and legal holidays excepted.

(d) Waiver of Right of Protest.—A deviation from any rule is only permissible in case of emergency or stress of circumstances and then only when the consent of all entrants in a contest is obtained in writing, which consent shall act as a waiver of entrants' right of protest against such deviation.

Any contestant who voluntarily competes in any event or contest which is not in accordance with the entry blank conditions as published by the promoter thereby waives his right of protest against the nonenforcement of such conditions.

54. **Deposit Required.**—The person protesting shall, at the time he makes the protest, deposit Ten Dollars in the hands of the Referee, which, if the protest is not sustained, shall be forwarded to the Contest Board, with the Referee's report thereon.

A protest may also be made, without a deposit, by a Member or Representative of the Contest Board or official of the meeting in his official capacity.

55. **Appeals to Contest Board.**—An appeal from the decision of the Referee on a protest may be made to the Contest Board by the person against whom the decision has been made. Such an appeal must be forwarded to the Chairman of the Contest Board within three days after the rendering of the decision and must fully set forth the facts of the case and be accompanied by sworn statements or affidavits necessary to substantiate the appeal, and a copy thereof shall be sent at the same time to the Referee from whose decision the appeal is taken. The Contest Board may if necessary require further sworn statements to be subsequently submitted by any or all of the parties to the appeal. A fee of $50 must be sent with the appeal, which fee will be returned if the decision appealed from be reversed, otherwise it shall be forfeited to the Contest Board of the American Automobile Association.

56. **Expenses of Appeal to Contest Board.**—All costs and expenses in relation to determining a protest or conducting an inquiry, and any reasonable compensation for outlay concerned, shall be paid by the party against whom the final decision is rendered.

57. **Non-Judging Member of Contest Board.**—No member of the Contest Board may sit in judgment when the Board is considering an appeal from a decision which he has rendered, or in which he is personally interested. The decision of the Contest Board shall be final.

DISQUALIFICATION.

58. **Unsanctioned Contest.**—The act of competing, or acting as an official, or exhibiting in an unsanctioned contest, or on an unlicensed track, shall disqualify without action of the Contest Board, and such disqualification shall remain in effect until removed by formal action of the Contest Board. An entry in any unsanctioned contest, or an authorized announcement in public print that an entry has been or will be made, shall be deemed sufficient cause for immediate disqualification by the Contest Board of the owner, entrant, driver and car, or any or all of them.

59. **False Declaration.**—Should a false declaration be made by an entrant, the Contest Board or Referee shall disqualify the entry, and the entrant shall stand suspended until such time as the Contest Board shall remove the suspension.

60. **False Entry.**—Any entrant or his duly appointed agent guilty of entering a car in any event for which it is not eligible, shall be suspended, until such time as the suspension has been removed by the Contest Board.

61. **Foul Driving.**—Foul driving either in a contest or practice, shall be punished by disqualification for all events of the meeting, and the offender shall be suspended for such time as the Contest Board may determine.

62. **Failure to Start.**—Should an entrant fail to start, he shall, unless excused by the Referee, be reported to the Contest Board and by it suspended for such time as it may determine.

62A. **Competing with Unregistered Driver.**—A registered driver who competes in any event with an unregistered driver shall be suspended for such time as the Contest Board may determine.

62B. **Competing on Unlicensed Track.**—A registered driver who competes on an unlicensed track shall be suspended for such time as the Contest Board may determine.

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tion provided by the Promoter, which shall consist of a number of sufficient size to be plainly seen by the spectators and officials, placed upon the right and left sides of the car, and, if possible, painted on the front of the bonnet or hood and on the rear of the car. This rule shall apply also to cars while in practice.

74. **Supply Stations.**—Manufacturers, dealers or others who are able to satisfy the Referee that they have a legitimate interest in a contest and who desire to establish supply or repair stations may do so, with the consent of the Referee or his authorized representative, but such manufacturers, dealers or other persons shall be considered as contestants and shall be governed by all the provisions of these rules, and contestants for whom the supplies shall be provided shall accept responsibility for all the acts of the persons in charge.

75. **Advertising.**—All advertising matter which any entrant or contestant may publish or cause to be published referring to any contest in which he may be or may have been entered must be in strict accordance with the official report of such contest.

(a) Any manufacturer, dealer, agent, driver, owner or entrant who shall, directly or indirectly, advertise, or permit to be advertised, the performance of any car as a stock car performance in any event other than a regularly sanctioned event for stock cars or stock chassis shall be subject to suspension for such time as the Contest Board may direct.

(b) No performance shall be advertised as a "record" until claim for same has been made and officially accepted as a "record" by the Contest Board, as provided in Rule 78.

Any violation of this rule or publication of statements tending to mislead or misrepresent the facts shall render the manufacturer, agent, entrant, contestant, or any or all of them subject to suspension for such time as the Contest Board may direct.

(c) Any owner, manufacturer, dealer, agent, or driver taking part in or directly connected with any contest otherwise than under these rules, and obtaining extensive advertisement therefrom, shall be deemed to be guilty of a breach of these rules.

(d) Any owner, manufacturer, dealer, agent, or driver who is not entered in or officially connected with a contest, but uses the name of such contest for private purposes and publishes statements tending to mislead or misrepresent the facts shall be subject to suspension for such time as the Contest Board may direct.

(e) A stock car or chassis manufactured, registered, entered and competing in any contest by and under the name of one company cannot have its performance featured in publicity as the performance of the product of or under the name of any other company.

76. **Under Own Power.**— In a contest of any form a car must proceed over the entire distance under its own power, except as is hereinafter provided to the contrary.

77. **Women Competitors Not Allowed.**—A woman shall not be allowed to participate in any speed competition or official practice for same on track or road. A woman may, however, be permitted to drive a car in a reliability or other touring contest, but in such a case she shall not be recognized as an official entrant, contestant, competitor or driver, who must in every case be a man. (See Definitions of Driver, Entrant, Page 4.)

78. **Records.**—The Contest Board shall pass upon all records, and may decline to accept any claim which, in its opinion, would not promote the interests of the sport.

No claim for a record of one mile or under and up to five miles will be considered by the Contest Board unless the same is taken by an automatic electrical or mechanical timing device approved by the Board, and the actual printed evidence taken by such timing device is submitted to the Board, together with the claim for the record.

No record will be recognized unless claim for same is made within ten days of its accomplishment, unless the Contest Board consider that the circumstances warrant a delay

No claim for record will be considered unless the sworn statements of the Referee, Chief Timer and Surveyor of the track or course are presented to the Contest Board.

The Contest Board shall retain all proofs and other documents produced in respect of claims for records and shall deal with such proofs and documents as it sees fit.

The Contest Board shall keep a Register of Records. The distances which are recognized officially for the purpose of record are:

Standing Start.	Flying Start.	
½ Mile	½ Mile	10 Miles
1 Kilometer	1 Kilometer	15 Miles
1 Mile	1 Mile	20 Miles
2 Miles	2 Miles	25 Miles
3 Miles	3 Miles	50 Miles
4 Miles	4 Miles	75 Miles
5 Miles	5 Miles	100 Miles

Records made on specially constructed speedways shall be known as "speedway records."

Records made in class competition on speedway, track or road shall be known as "class records" and if advertised must state the class.

Records made in free-for-all competition or in individual trials against time are records regardless of class.

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62C. **Unsanctioned Meeting on Licensed Track.**—The owners or lessees of a licensed track who permit an unsanctioned meeting to be held thereon shall be suspended and their track license cancelled for such time as the Contest Board may determine.

62D. **Unregistered or Disqualified Driver on Licensed Track.**—The owners or lessees of a licensed track who permit an unregistered or disqualified driver to use said track shall be suspended and their track license cancelled for such time as the Contest Board may determine.

62E. **Tracks Ineligible for License.**—The owners or lessees of any track who permit an unregistered or disqualified driver to use said track, or permit an unsanctioned contest to be held thereon shall thereby render such track ineligible for track license as provided by Rule 202, unless such ineligibility is removed by the Contest Board.

63. **Effect of Disqualification.**—Disqualification for any infraction of the foregoing rules shall debar the offender from participation in any and all of the awards for the event in which he competed. On receiving notice of disqualification, the disqualified person shall withdraw his car from the course.

63A. **Exclusion from Course and Grounds.**—Whenever the penalty of suspension or disqualification is prescribed in these rules, it shall be construed to mean an unconditional exclusion and disqualification from any participation, either directly or indirectly, in the privileges and uses of the course and grounds of any Promoter during the progress of a sanctioned meet.

MISCELLANEOUS.

64. **Entrant and Driver Responsible.**—An entrant shall be held responsible for the acts and omissions of his driver and vice versa, each being equally responsible for infraction of these rules.

65. **Driver and Mechanic.**—If any driver or mechanic entered in any race is under age, he must furnish the officials with a written consent to enter the race, signed by his parents or guardian.

At the request of the Referee a driver or mechanic must furnish the officials with a certificate from a reputable physician certifying as to his physical or optical fitness to enter the race, or may be required to submit to a suitable test to determine such fitness.

66. **Suits for Damages, Etc.**—All suits of any kind whatsoever, arising from an entrant's competition in contests held under these rules, or in practice or preparation for such contests, shall be borne and resulting judgments satisfied by him. Promoters, however, shall be required to use every precaution in the proper preparation of the track or course on which contests are to be held and in the proper safeguarding of such track or course during those hours set apart and advertised for practice or for the running of the contest itself. Promoters shall be held responsible for any accidents resulting from their negligence or from their failure to comply with these requirements.

67. **No Recourse Against Association.**—An entrant or competitor shall have no recourse against the American Automobile Association, its Contest Board or any of its officials under any circumstances; and none against the promoter, except in case of accident resulting from the promoter's own negligence as specified in Rule 66.

68. **No Betting Permitted.**—The making or laying of bets or wagers shall not be permitted.

69. **Motor Exhaust.**—The exhaust must be conducted outside of the bonnet and so directed as not to raise dust.

69A.—**Floor and Dash Boards.**—In all contests cars must be equipped with satisfactory floor and dash boards.

70. **Loss of Bonnet.**—The bonnet must be carried throughout a contest. If the bonnet becomes detached or lost from a car, the driver shall be required to bring his car to a stop in the shortest possible distance consistent with safety and remain at a standstill until the bonnet has been recovered and replaced.

In a road race he shall not pass the judge's stand until the bonnet has been so recovered and replaced.

In contests on tracks and speedways, a bonnet lost in one lap may be recovered in the next succeeding lap.

71. **Fuel Supply.**—It shall be the duty of promoters of all contests to adopt adequate measures to insure the use of a standard and unadulterated fuel supply.

Each contestant shall furnish his own gasoline, which shall be subject to analysis by the promoter's technical committee before and after the contest, as may be deemed necessary. If the gasoline furnished by a contestant is condemned by the promoter's technical committee, the responsibility of replacing such supply with standard gasoline shall rest entirely with the contestant.

If the gasoline furnished by a contestant is found to be adulterated, it shall result in the disqualification of the owner, entrant, driver and car, or any or all of them.

72. **Replacement of Tires and Rims.**—In all contests the use of demountable or dismountable tires shall be permissible, it being understood that "demountable" or "dismountable" shall mean a tire attached to a detachable rim.

73. **Distinguishing Marks.**—A competing car may carry a sign bearing its name, in letters not exceeding 4 inches in height, upon its radiator, or one suspended from the running board on each side. No other sign shall be carried other than the official designa-

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In case of disability or accident to the driver of a car—but in no other case—the mechanic may replace such driver at any part of the course.

111. **Persons Allowed on the Course.**—No persons other than the contestants and two pit assistants for each, the Referee, Starter and Assistant, the representative of the Contest Board, the Technical Committee, and Judges, where necessary, shall be allowed on the course. Contestants and assistants must leave the course as soon as the race in which they have competed is at an end.

112. **Repairs and Adjustments.**—All mechanical repairs and adjustments must be made exclusively by the crew of a car.

113. **Repair Pits.**—There shall be located at the start and finish line one repair pit for each car started, not less than 15 feet long and 8 feet wide. The pits may be located at either one side or the other of the course; if located on the same side and in front of the grandstand, there must be an intervening distance of not less than 15 feet between the pits and the stand.

113A. **Repair Pit Attendants.**—Each contestant entering one car shall be entitled to have five attendants, including the team manager. For each additional car entered by the same contestant he shall be entitled to three pit attendants; in either case only two pit attendants shall be permitted to make replacement of gasoline, oil and water and replacement or replenishment of tires, or crank the motor, *when contestant's car is at a standstill at its pit*, but said attendants shall in no case make any mechanical repairs or adjustments to the car or assist in any manner in such repairs and adjustments.

Pit attendants are not allowed under any circumstances to pump air or oil into a car.

Spare parts, tools, etc., may be laid on the shelf or ledge in front of the pit, and pit attendants, while in the pit, *but not otherwise*, may hand same to the driver or mechanic.

A violation of this rule shall disqualify the car.

Smoking in the pits is prohibited.

Sitting or standing on the sides of the pits is prohibited.

No car shall be permitted to leave its pit until all tools, tires, etc., on the ground in front of pit shall have been removed.

The careless throwing or rolling of a tire or other obstruction on the course by the pit attendants or crew of a car may disqualify the car.

114. **Renewals of Supplies.**—All renewals of gasoline, oil, water and parts shall be made at the repair pits at the start and finish line, water emergencies excepted.

Provision shall be made at the pits for tire manufacturers' attendants and supplies.

115. **Renewals of Tires.**—Tires may be taken on at the pits at the start and finish line and, if necessary, at one other station, to be located on the course.

Demountable Rims Permitted.—(See General Rule 72.)

Distinguishing Marks.—(See General Rule 73.)

116. **Leaving the Course.**—Any competing car voluntarily leaving the course shall be disqualified.

117. **Weighing In and Inspection.**—Entrants in events under minimum weight classification shall be notified in advance by the promoter of the date for weighing in (see Rule 9) and inspection by the promoter's Technical Committee (see Rule 45), which shall be not less than two days before a race (except by special arrangement between the entrant and the Technical Committee) and shall be furnished with a certificate of eligibility, which they must exhibit to the Starter or his Assistant before they will be permitted to start in a contest.

118. **Eligibility of Cars to Start.**—No car shall be allowed to start unless it is furnished with and exhibits to the Starter or his Assistant the Certificate of Eligibility of the promoter's Technical Committee, certifying that the car has been properly inspected, stamped and weighed.

The following is the form of the Certificate of Eligibility:

CERTIFICATE OF ELIGIBILITY TO START.

This card must be handed to the Assistant Starter before the car will be permitted to line up for starting in the race.

THIS IS TO CERTIFY that this Committee has inspected and weighed the .....car, Racing Number....., and have found it to comply with the Classification Rules of the Contest Board of the American Automobile Association and that all seals and stamp marks applied by this Committee are found to be intact and that the car is eligible to start in the.....Race.

Driver's Registry Number.....

.....Chairman.

..... } Technical
..... } Committee.

(Place).....

(Date).....

119. **Fraud.**—Any attempt at fraud in the evasion of the Definitions "Stock Car" and "Stock Chassis" and status of the car on the part of an entrant shall disqualify the car, the driver and the entrant.

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No record will be allowed as a "Class Record" unless same is made in an event restricted to any one of the divisions of Classes "B" or "C." Records made in an event open to more than one division of Classes "B" or "C" shall be known as "Records Regardless of Class."

79. **Intermediate Distances.**—In any attempt to lower a record for a given distance, a contestant must announce in advance the intended distance or distances, and records can only be taken in regular rotation from the starting line.

No record for an intermediate distance in competition will be allowed unless the car finishes the event.

SUPPLEMENTARY REGULATIONS.

80. A promoter desiring to make further regulations to cover some particular form of contest shall submit such supplementary regulations to the Contest Board for its approval, notice of which approval shall appear upon such regulations when issued as follows:

"Supplementary Regulations for ———————— Contest Approved by the Contest Board of the A. A. A."

AMENDMENTS.

81. These rules may be amended by the Contest Board of the American Automobile Association.

ROAD RACING RULES.

100. **Subject to General Rules.**—All races on the road shall be subject to the General Rules hereinbefore contained and, in addition, to the following Special Rules:

101. **Eligible Competitors.**—(See classification of competing cars and definitions of "stock car" and "stock chassis," pages 5, 6 and 7.)

No car shall be permitted to compete in any "stock car" or "stock chassis" (Class "A" or "B") contest unless the required certificate of description (see pages 5 and 6) shall have been on file in the main office of the Contest Board for at least thirty days prior to the date of the contest, and the car has been duly registered.

102. **Application for Sanction.**—An application for a sanction for a road race shall be made two (2) months in advance of the date thereof.

103. **Permits to Use Roads.**—Before official sanction will be granted for a road race, hill climb or speed trials, or any other competition on the public highway, a promoter shall first obtain the properly authorized permission of any and all local authorities for the use of such highway and shall file the original or a certified copy of such permission with the Contest Board.

104. **Safeguarding Public and Contestants.**—Before official sanction will be granted for a road race, hill climb or speed trials, or any other competition on the public highway, a promoter shall furnish evidence satisfactory to the Contest Board that he has taken every possible precaution to safeguard the general public and the contestants, including the proper preparation of the roadway, and especially for the prevention of dust, the policing of the course, closing of highways and erecting fences where needed, and shall file the original or a certified copy of any and all contracts and agreements made or entered into by him for the accomplishment of such safeguards. (See Rules 66 and 67.)

105. **Entry.**—Not more than three cars of any one make may be entered in any one division.

106. **Entry Fee.**—The total entry fee must accompany each entry and the amount of the entry fee shall in no case be refunded.

107. **Meeting of Drivers and Entrants.**—Before the start of a road race, all drivers and entrants shall be required to attend a meeting held for the purpose of instruction as to the intent of the rules. This meeting shall be in charge of the Referee.

Motor Exhaust.—(See General Rule 69.)

Loss of Bonnet.—(See General Rule 70.)

108. **Gasoline.**—The use of any agent of oxidization other than atmospheric air is forbidden.

Each contestant must furnish his own gasoline, which must be stored in the pits on the morning of the race. Analysis of gasoline may be made by the promoter's technical committee before or after a race, as may be deemed necessary. If the gasoline furnished by a contestant is condemned by the promoter's technical committee, the responsibility of replacing such supply with standard gasoline shall rest entirely with the contestant.

If the gasoline furnished by a contestant is found to be adulterated, it shall result in the disqualification of the owner, entrant, driver or car, or any or all of them.

109. **Crew.**—Each car must carry two persons, seated side by side, of a minimum average weight of 125 lbs. each.

110. **Change of Drivers.**—The driver and mechanic of a car may be changed, if need be, during a race, but only at the end of a lap and upon application to the Referee.

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120. **Weighing Out and Inspection.**—At the termination of a contest under minimum weight classification, each finishing driver who may be entitled to a prize shall immediately proceed to the designated weighing station for weighing out and inspection by the promoter's Technical Committee and certification as to his eligibility for prize award. If his car weight is more than 200 pounds above the minimum requirement, the Technical Committee may, in its discretion, omit the weighing out only.

CERTIFICATE OF ELIGIBILITY FOR PRIZE AWARD.

THIS IS TO CERTIFY that this Committee has REINSPECTED AND WEIGHED THE.....Car, Racing Number....., driven by ....., and found all seals and stamp marks to be intact. The car is therefore eligible to award.

.....Chairman.
..... } Technical
..... } Committee.

My records show that the above car finished the contest in.....position. Time, ...min., ...sec.

.....Chief Timer.

(Place).....
(Date).....

.....Referee.

121. **Stopping Race.**—The Referee shall have the right to stop a race before its scheduled termination if emergency demand such action, and in such a case no award shall be made.

122. **Order of Start.**—The order of start of the cars entered in a contest shall be determined by lot at least three (3) days prior to the date of the contest.

The drawing shall take place in the order of entry.

When two or more cars of the same make fall together in the drawing, one or more of them shall be moved down one place until separated by another make of car.

123. **Starting Interval.**—The interval at which cars shall be started shall be determined by the Starter and Referee, taking into consideration the length of the course and the number of competing cars.

124. **Signalling to Contestants.**—International Road Racing signals shall be used on the course.

Red flag.....Clear course.
Yellow flag.....Blocked course; stop.
Green flag.....You are entering your last lap.
White flag.....Stop at pit on next lap for consultation.
Black and white checkered flag....You are finished.
Black flag with white center.....A competitor is trying to overtake you (road judges' flag for use on narrow stretches of course).

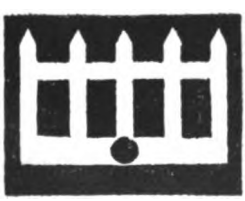
125. **Road Signs.**—The course shall be marked by banners bearing the International Road signs, as follows:

Turn to Right

Turn to Left

"S" Turn

Passage under Road



Grade Crossing

Village

126. **Passing on the Road.**—The mechanic of a competing car must constantly look to the rear and warn his driver of an overtaking car.

A contestant overtaking and passing another on the road must pass to the left.

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OFFICIALS.

127. **Officials.**—The officials, in addition to the Referee and their duties shall be as follows:

128. **Judges.**—There shall be three Judges, whose position during the race shall be at the start and finish line, or in any other position assigned by the Referee. The numbers of the placed cars shall be taken, one each by the three Judges respectively. The decision of the Judges as to the order of finishing shall be final. The judging of the cars shall be determined by the instant of contact of the tires of the front wheels with the tape.

129. **Timers.**—There shall be a Chief Timer, whose duty it shall be to appoint his assistants, of whom there shall be two or more. He shall be responsible for the accuracy of all watches used in calculating the elapsed time of any contest.

In the event of a disagreement of the watches, the time of any two agreeing shall be official.

Should all of the watches disagree, the intermediate time shall be official.

He shall record the time of placed competitors and see that it is properly entered by the Scorer to be filed as permanent records of the contest.

He shall sign every report issued by the timers, and no report shall be official unless signed by him.

He shall not report or announce any special report of time or score of any competitor except on orders from the Referee.

130. **Starter.**—It shall be the duty of the Starter, after he has been advised by his assistant that the competitors are ready, to ascertain that the Timers are ready and start the cars at whatever interval has been determined upon.

131. **Start.**—After the Starter has given the signal to start, a car will be considered to have officially started whether it crosses the line or not.

132. **Scorer.**—There shall be an official Scorer under the direction of the Chief Timer, with such assistants as may be necessary, whose duty it shall be to score the laps, keep a record of the time and position of the placed competitors, and procure the signatures of the Referee, Judges and Timers to the official score sheet.

133. **Method of Timing.**—(a) In all road races, a certified chronometer shall be used for the purpose of checking the accuracy of the Timers' watches.

(b) In straightaway record trials the time must be taken by an automatic electrical or mechanical timing device, approved by the Contest Board.

134. **Start Under Own Power.**—A car shall be started exclusively by its own power not only at the start, but in restarting after any stoppage, except that it may be pushed to the starting line before the start or on and off the course.

135. **Surveyor's Certificate.**—Claims for records must be accompanied by a Surveyor's certificate as to the correctness of the distance run, measured at the center of the road.

136. **May Be Ordered to Leave Course.**—Whenever the Referee is satisfied, after consultation with the other officials, that a competitor no longer has a chance of obtaining one of the first three places in a race, he may order such competitor from the course and the competitor shall promptly comply.

TRACK RACING RULES.

200. **Subject to General Rules.**—All track races shall be subject to the General Rules hereinbefore contained and, in addition, to the following Special Rules:

201. **Track Classification.**—Tracks shall be classified as follows:

Circular Dirt Tracks.

Specially Constructed Speedways.

202. **Tracks Must Be Licensed.**—Every track must be examined by a representative of the Contest Board, and if the track and arrangements meet with the requirements of the Board, it will be duly licensed. Licenses shall expire on December 31st in each year. Applications for renewals must indicate any changes made in track, fences or buildings.

202a. **Fee for Track License.**—The annual fee for a track license shall be five dollars.

203. **Fences.**—Fences must be at least thirty (30) feet away from the inside edge of the track and should be of such a nature as not to endanger the lives of the driver and mechanician of a competing car should it come in contact with such fence

204. **Ditches or Obstacles.**—Ditches or obstacles will not be allowed on the inside of a track, or between the fence and the track.

205. **Adequate Measures,** other than sprinkling with water, must be provided for laying the dust.

206. Tracks which, from the nature of their surface or turns (whether on account of dust, roughness fencing or otherwise), may be considered dangerous by the Contest Board, will not be licensed by it.

207. **Sanctions for Meets on Licensed Tracks.**—The Contest Board may, on application, two (2) weeks or more in advance of the date set for a contest, grant an official

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sanction for a contest on a track which has been licensed as specified in Rule 202, provided the Board is satisfied that there has been no material alteration in such track, its fences or buildings since the issuance of such license.

No sanction shall be granted for a track contest of more than three (3) days duration.

TRACK OFFICIALS.

208. **Officials.**—The promoter shall turn over the track to the Referee in proper condition for the race one hour before the time announced for the start.

The officials, in addition to the Referee, and their duties shall be as follows:

209. **Judges.**—There shall be three Judges, whose position during the race shall be at the edge of the track, two at one end and one at the opposite end of the tape, or in any other position assigned by the Referee. The numbers of the placed cars shall be taken, one each by the three Judges respectively. The decision of the Judges as to the order of finishing shall be final. The judging of the cars shall be determined by the instant of contact of the tires of the front wheels with the tape.

210. **Timers.**—(a) There shall be a Chief Timer, whose duty it shall be to appoint his assistants, of whom there shall be two or more. He shall be responsible for the accuracy of all watches used in calculating the elapsed time of any contest.

(b) He shall record the time of placed competitors and see that it is properly entered by the Scorer to be filed as permanent records of the contest.

(c) **Mechanical Scoring.**—He shall have charge of the scoring, and in a track race of fifty miles or more there shall be used a mechanical method of recording the score of each contestant.

He shall sign every report issued by the Timers, and no report shall be official unless signed by him.

He shall not report or announce any special report of time or score of any competitor except on orders from the Referee.

211. **Starter.**—It shall be the duty of the Starter, after he has been advised by the Assistant Starter that the competitors are ready, to ascertain that the Timers are ready, and then give the signal to start by dropping a flag, or in the event of a standing start, by dropping a flag or firing a pistol. He shall have the absolute control of the competitors from the time they are reported ready by the Assistant Starter until the start has taken place. The Starter shall have power to decide what is a fair start.

212. **Assistant Starter.**—The Assistant Starter shall have as many assistants as may be necessary. It shall be his duty to notify competitors in due time of the events in which they are entered; see to the arrival of the competitors at the starting point on time, and to place them in their respective positions. He may also act as Starter.

213. **Umpires.**—There shall be two or more Umpires, whose duty it shall be to take positions on the track assigned them by the Referee, at intervals not greater than one-half mile apart; telephone communication shall be installed between the Judges' stand and the Umpires' stations, and the Umpires shall note carefully the progress of the race, and be prepared to report upon claims of unfair driving by competitors, and any other incident affecting the result of the race.

214. **Scorer.**—There shall be an official Scorer under the direction of the Chief Timer, with such assistants as may be necessary, whose duty it shall be to score the laps, keep a record of the time and position of the placed competitors, and procure the signatures of the Referee, Judges and Timers to the official score sheet.

215. **Flag Signals.**—The following signals shall be observed:

Green flag: You are entering your last lap.

Black and white checkered flag: You are finished. (See Rule 124.)

TIMING.

216. **Method of Timing.**—(a) The time of a race with a standing start shall be taken from the drop of a flag or the firing of a pistol by the Starter, or otherwise.

(b) The time of a race with a moving or flying start shall be taken from the contact of the front wheels of the leading car with the tape.

(c) In a time handicap the time shall be taken from the start of the scratch competitor.

(d) In the event of a disagreement of the watches the time of any two agreeing shall be official.

(e) Should all of the watches disagree the intermediate time shall be official.

(f) In all races a certified chronometer shall be used for the purpose of checking the accuracy of the Timers' watches.

217. **Records.**—(See General Rule 78.)

No record made on a circular dirt track less than one mile in length will be allowed.

STARTING.

218. **Methods of Starting.**—Starts may be standing, moving or flying; due notice of the method being given on the program. In the event of failure to state the method, a moving start shall prevail.

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(a) In a standing start the front wheels of each car must be upon the tape and each car must remain stationary until the signal is given.

(b) In case of a moving start the car shall be started at a point 200 yards behind the tape. The pace from the starting point to the tape shall be set by the car nearest to the pole. If the pole car fails to set a pace satisfactory to the Referee he may give the position to the car next in order, and send the pole car to the outside. There shall be an assistant to the Starter placed not less than 100 yards in front of the starting line, who, on the drop of the flag by the Starter, shall also drop a flag.

(c) In the case of a flying start the cars may start at any distance behind the tape and cross the tape at the highest possible speed. The signals to be given by the Starter and the Assistant Starter shall be as specified in the preceding rule.

(d) **Number of Starters.**—No event on a day's program may be run in which there are less than three cars of at least two different makes entered and ready to start, except in case of a "walkover."

219. **Positions.**—The positions of competitors at the start shall be decided by lot. There shall be a distance of at least four feet between the hubs of contesting cars.

219a. **Entrants Report to Starter.**—The entrants in all of the events on a day's program shall report with their cars to the Starter or his Assistant, thirty (30) minutes before the hour at which the *first* event is scheduled to start.

220. **Delay.**—A contestant who fails to respond promptly to the call of the Assistant Starter shall forfeit his right to his position and shall take the outside. There shall be no delay at the start on account of absentees, and no contestant shall be permitted to take a place in the line after the contestants have been reported to the Starter by his assistant.

221. **Start Under Own Power.**—A car shall be started exclusively by its own power, not only at the start but in restarting after any stoppage, except that it may be pushed to the starting line before the start or on and off the course

222. **Start.**—After the Starter has given the signal to start, a car will be considered to have officially started, whether it crosses the line or not.

HEATS.

223. **Arrangements of Heats.**—The Starter shall, in case there are a larger number of entries than can be started in a race under these rules, divide the competitors into two or more heats, each as nearly equal in number as possible, such arrangement to be subject to the approval of the Referee.

224. **Starters in Final.**—The winner of each heat and the fastest second car shall compete in the final. Any competitor who qualifies in a heat must take part in the final, unless excused by the Referee.

225. **Dead Heat.**—In case of a dead heat the event shall be run again, unless the contestants agree, between themselves, as to the disposition of the prizes.

226. **Walkover.**—In any event in which there are at least three entries and but one entrant presents his car at the starting line and is ready to start, he shall be entitled to a "Walkover" and award of the prize for that event. It shall be optional with the Referee whether the contestant be required to go the whole or a part of the distance. The Referee may impose a reasonable time limit.

226a. **Handicap Races.**—All handicaps shall be framed by an official handicapper and shall be in the form of a time allowance based on a car's performance either in practice or competition on the day of the handicap event.

No handicap event may be run on any day's program until the cars entered therein have competed in at least one previous event on the same day.

No handicap event may be run for a greater distance than ten (10) miles.

MISCELLANEOUS.

227. **Persons Allowed on Track.**—No persons other than the contestants and two pit assistants for each, the Referee, Starter and Assistant, the representatives of the Contest Board, the Technical Committee, and Judges where necessary, shall be allowed on the track. Contestants must leave the track as soon as the heat or race in which they have competed is at an end.

228. **Rail at Left.**—All track races shall be run with the left hand of the driver toward the rail or pole.

229. **Driving Reverse Way of Track.**—Any contestant who drives the reverse way of the track shall be immediately disqualified and suspended, and reported to the Contest Board. The Referee has no alternative in this regard.

230. **Passing.**—It shall be the duty of the operator of the leading car to hold the inside or left hand side of the track, as nearly as may be practicable. One contestant overtaking and passing another must pass on the outside unless the car in front shall be so far from the inside as to render it safe to pass on the inside. After having passed to the front, a competitor shall not take the inside or cross in front of the competitor passed unless a clear full length ahead, under penalty of disqualification.

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231. **Exceptions.**—If, by reason of the position of the leading car, there is no room to pass as provided in Rule 230, the overtaking car may pass on the other side, the operator in that case accepting the risk of fouling, except in case of a deliberate foul by the operator of the car overtaken.

232. **Dangerous Track.**—Should the track, or any part of it, in the opinion of the Referee, become dangerous, he shall have the power to stop the contest for such length of time as he deems necessary to put the course into safe condition, such time not to count in the period set for the contest.

233. **Surveyor's Certificate.**—Claims for records must be accompanied by a Surveyor's certificate as to the correctness of the distance run, measured three feet from the pole, together with evidence that the course is level.

234. **Passengers.**—A competitor in a track race may carry one adult male passenger, seated beside the driver, weighing at least 125 lbs., who may act as an assistant.

235. **Work on Car.**—After reporting to the Assistant Starter no work shall be done on a car except by the driver and his assistant.

236. **May Be Ordered to Leave Course.**—Whenever the Referee is satisfied, after consultation with the other officials, that a competitor has no longer a chance of obtaining one of the first three places in a race, he may order the competitor from the course and the competitor shall promptly comply.

Motor Exhaust.—(See General Rule 69)

Loss of Bonnet.—(See General Rule 70.)

Distinguishing Marks.—(See General Rule 73.)

LONG DISTANCE TRACK RACES

(Not 24-Hour.)

237. **The following additional rules** shall be enforced in any track race of one hundred miles or over:

238. **Change of Drivers.**—No driver shall be permitted to drive or have charge of a car for more than three consecutive hours, except upon a specially constructed speedway approved by the Contest Board, in which case the drivers shall be required to change every five hours unless allowed by the Referee to drive for a longer period.

239. **Road Racing Rules Apply.**—Where a long distance race is held on a track or a specially constructed speedway the following Road Racing Rules shall apply:

Repairs and Adjustments (Road Rule 112).—All mechanical repairs and adjustments must be made exclusively by the crew of a car.

Repair Pits (Road Rule 113).—There shall be located at the start and finish line one repair pit for each car started, not less than 15 feet long and 8 feet wide. The pits may be located at either side of the course; if located on the same side and in front of the grandstand there must be an intervening distance of not less than 15 feet between the pits and the stand.

Repair Pit Attendants (Road Rule 113a).—Each contestant entering one car shall be entitled to have five attendants, including the team manager. For each additional car entered by the same contestant he shall be entitled to three pit attendants; in either case only two pit attendants shall be permitted to make replacement of gasoline, oil and water and replacement or replenishment of tires, or crank the motor, *when contestant's car is at a standstill at its pit*, but said attendants shall in no case make any mechanical repairs or adjustments to the car, or assist in any manner in such repairs and adjustments.

Pit attendants are not allowed under any circumstances to pump air or oil into a car.

Spare parts, tools, etc., may be laid on the shelf or ledge in front of the pit, and pit attendants, while in the pit, *but not otherwise*, may hand same to the driver or mechanic.

A violation of this rule shall disqualify the car.

Smoking in the pits is prohibited.

Sitting or standing on the sides of the pits is prohibited.

No car shall be permitted to leave its pit until all tools, tires, etc., on the ground in front of pit shall have been removed.

The careless throwing or rolling of a tire or other obstruction on the course by the pit attendants or crew of a car may disqualify the car.

Renewals of Supplies (Road Rule 114).—All renewals of gasoline, oil, water and parts shall be made at the repair pits at the start and finish line, water emergencies excepted.

240. **Paddock.**—Where such long-distance race is held on a one-mile-track, if pits are not provided there shall be a paddock which shall be in charge of an inspector appointed by the Referee, and the above rules relating to Repairs and Adjustments, Repair Pits and Attendants and Renewals of Supplies shall apply with equal force to such paddock.

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SPECIAL RULES FOR 24-HOUR TRACK RACES.

241. All of the General Rules, the Track Racing Rules and, in addition, the following special rules shall apply:

242. **Half-Mile Track.**—No twenty-four hour race shall be permitted on a half-mile track.

243. **Speedway Pits.**—On speedways, where repair pits are provided, the following rules in so far as they refer to the "paddock" shall apply with equal force to such pits.

244. **Drivers May Alternate.**—The drivers nominated at the time of entry shall be permitted to alternate.

No driver shall be permitted to drive or have charge of a car for more than three consecutive hours, except when allowed by the Referee to drive for a longer period After the expiration of such three-hour or longer period he shall not be again permitted to drive until he has taken at least one hour's rest.

In case of sickness or accident to a driver or drivers, application may be made to the Referee, who may give permission to substitute another driver or drivers.

245. **Paddock.**—There shall be a paddock at the track which shall be in charge of an inspector, appointed by the Referee.

246. **Entrance to Track from Paddock.**—The entrance to the track from the paddock must be on an angle of not less than twenty degrees.

247. **Taking on Supplies.**—All supplies must be taken on and repairs, replacements and adjustments made in the paddock, except as provided in Rule 248.

248. **Repairs, Supplies and Adjustments on Track.**—No repairs or adjustments shall be permitted to be made upon a car or supplies taken while on the track, except as follows:

(a) Forced Stop.—Driver and mechanic only may work on a car in order to make temporary repairs or adjustments.

(b) Accident.—In case of accident where the car is disabled it may be towed to the paddock by a car approved by the Referee.

(c) Tire Trouble.—No tires shall be changed on the track. In case of tire trouble, the driver or mechanic can perform only such work as will enable the car to run to the paddock.

(d) Supplies Taken on Track.—Should a car run out of gasoline and stop on the track, enough gasoline may be supplied to it to enable it to reach the paddock.

249. **Repairs and Replacements.**—Repairs and replacements shall be restricted to the part or parts actually damaged. No complete assembled unit, such as a rear construction, transmission gear case, motor, clutch, etc., can be totally replaced unless damaged in all of its parts. When one or more parts of an assembled unit are damaged, such damaged parts only may be replaced.

The Technical Committee shall be charged with the enforcement of this rule.

250. **Assistant for Officials.**—Each official shall have an assistant to act as relief.

251. **Entering and Leaving Paddock.**—(a) Before leaving the track to enter the paddock, the contestant must have the pole on the homestretch and shall be subject to disqualification if this rule is violated. A contestant must not enter the paddock at a greater rate of speed than 25 miles per hour.

(b) On leaving the paddock he shall do so ONLY ON SIGNAL FROM THE PADDOCK INSPECTOR, stationed at the exit.

Green flag or light: Track is clear.

Red flag or light: Stop.

and on leaving shall hold the pole until he shall enter the backstretch.

252. **Lights on Cars.**—Each car shall be provided with two headlights, both to be kept lighted at all times, from sunset to sunrise, and two tail lights, electric, oil or gas, both to be kept lighted from sunset to sunrise.

Stopping on track to light lamps is prohibited.

253. **Lighting of Lamps.**—The Referee shall announce before the start of a race the hours during which lamps are to remain lighted.

254. **Lighting of Track.**—The entire track shall be adequately lighted during the period between sunset and sunrise, and in such a manner that no glare of light shall interfere with the contestants' vision.

255. **Signalling to Contestants.**—Signalling shall consist of the displaying of the number of the contesting car, with the following signal:

Green flag or light.....Report to camp in paddock.
Red flag or light.....Report to officials at start and finish line.
Red and green lights.....(In case of accident) *Stop IMMEDIATELY.*

When a car has once passed its signal to stop, it shall immediately withdraw from the track upon reaching the exit provided, but if the reason for the signal to stop is unknown to the occupants of the car it shall stop, where signalled, upon its next lap. It shall not again be scored until the reason for signal to stop shall have been removed and the car allowed to proceed by the Referee.

256. **Stop for Tire Trouble.**—No contestant shall be allowed to run on a flat tire or on a rim, in case a tire should be thrown, but shall immediately withdraw from the track upon reaching the exit provided.

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257. **Timing and Scoring.**—Every car shall be scored every time it crosses the line. (See Rule 210 (c) Mechanical Scoring.)

The score of all cars at the end of each hour shall be announced.

Any penalties for violation of the rules shall be deducted from the score at the end of the hour in which the violation occurred, or as promptly as the Referee is able to reach a decision. Deductions shall only be made on the written order of the Referee.

258. **Car Disabled on Track.**—In case of an accident, no employee of an entrant other than the driver and mechanic on the car at the time of accident will be permitted on the track, except with the permission of the Referee or his authorized representative.

259. **Physical Condition of Drivers.**—The Referee shall prohibit any driver or mechanic from entering or continuing in a race who in his opinion is physically unfit.

260. **Technical Inspection During Race.**—The Referee may order a technical inspection of any car which in his opinion is unsafe, and due allowance shall be made such car, at the rate it was traveling before the stoppage, for the time occupied by such inspection.

261. **Stopping and Restarting Race.**—In case the Referee intends to stop or delay a race for any period, the hour of such stop or delay must not be announced in advance. Upon signal to stop, the cars must line up in front of the Judges' stand and during the time the race is discontinued they shall be in charge of paddock inspectors and no work of any kind shall be done upon them. When a race is stopped the time of interval between the cars and their order of stopping must be taken by the Timers, and in restarting the same interval must elapse between the cars Cars in the paddock during the time the race is stopped shall have no work done upon them until the restarted cars have made one lap of the track.

262. **No Work on Cars During Intermission.**—No car can be touched or any work done thereon during any intermission. The Referee may penalize any car which violates this rule and fix the penalty in proportion to the breach committed, varying from two laps to full disqualification.

RULES FOR HILL CLIMBS.

300. **Subject to General Rules.**—Hill climbing contests shall be subject to all of the General Rules, and the following Special Rules:

Sanction.

Permits to Use Roads (Road Rule 103).—Before official sanction will be granted for a road race, hill climb, or speed trials, or any other competition on the public highway, a promoter shall first obtain the properly authorized permission of any and all local authorities for the use of such highway and shall file the original or a certified copy of such permission with the Contest Board.

Safeguarding Public and Contestants (Road Rule 104).—Before official sanction will be granted for a road race, hill climb or speed trials, or any other competition on the public highway, a promoter shall furnish evidence satisfactory to the Contest Board that he has taken every possible precaution to safeguard the general public and the contestants, including the proper preparation of the roadway, and especially for the prevention of dust, the policing of the course, closing of highways and erecting fences where needed, and shall file the original or a certified copy of any and all contracts and agreements made or entered into by him for the accomplishment of such safeguards.

301. **Length and Grade.**—The promoter must file with the Contest Board ten days before the running of any hill climbing contest a surveyor's certificate of the length of the hill to be climbed and a profile showing the greatest percentage of grade at any point and the average grade for the total distance.

These figures must also be stated in the entry blank.

302. **Amateurs.**—Amateurs may drive in any event provided the cars comply with the requirements of class and division. In such cases special prizes shall be offered "For Amateurs Only" in each class.

303. **Passenger Load.**—Five or seven-passenger touring cars shall carry four persons averaging 125 lbs. each.

Two, three or four-passenger cars shall carry two persons averaging 125 lbs. each.

A competing chassis may carry two persons.

Ballast (preferably in the form of bags of sand) to the equivalent of 125 lbs. for each passenger called for by this rule may be carried, but no ballast shall be carried which is not acceptable to the Technical Committee.

304. **Officials.**—There shall be a Referee, a Starter with such assistants as the Referee may appoint, two or more Judges, at least three Timers at each end of the course, a Scorer and a Technical Committee of at least three members.

305. **Duties of Judges.**—The Judges shall take positions assigned to them by the Referee, note carefully the progress of the contest and be prepared to report upon claims of violations of these rules.

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306. **Duties of Starter and Assistant Starter.**—The Starter shall satisfy himself that the Timers and other officials are ready and give the signal to start.

An assistant starter shall be posted at the finish line at the top of the hill. Where there exists no other way of returning to the starting line than by way of the course, it shall be the duty of the assistant starter to hold the cars which have completed the climb until ordered by the Referee to allow them to return to the starting line.

307. **Duties of Timers.**—It shall be the duty of the Timers to record, if possible, by means of an automatic device, otherwise by a comparison of watches, the time of each competitor and sign a certificate which shall form part of the Referee's report.

308. **Duties of Technical Committee.**—It shall be the duty of the Technical Committee to examine the cars and report to the Referee upon the eligibility of all entries.

309. **Official Stands.**—There shall be provided official stands at the starting and finishing lines, to which none but the Timers, the Scorer, the Starter and his assistants and the Referee shall be admitted.

310. **Clear Course.**—Under no circumstances shall a car start until the Starter has satisfied himself that the course is clear.

311. **Starting.**—Entrants in each division shall be started in accordance with the rotation of numbers in that division.

312. **Standing Start.**—In case of a standing start the front wheels of the car must be upon the tape and the car must remain stationary until the signal is given by the Starter.

313. **Flying Start.**—In case of a flying start the car shall start at a given distance from the tape on signal from the Starter or his assistant.

314. **False Start.**—In case the hill is climbed from a standing or flying start, the passing of a fixed point beyond the starting line, indicated by a flag, shall constitute an official start.

315. **Return to Starting Line.**—Where it is possible, a road other than the course should be selected by which cars which have completed their trials may return to the starting line.

316. No car shall be permitted to return to the starting line by way of the course during a trial. If it is not possible to return to the starting line except by way of the course, the Referee shall order the event discontinued until such cars as he permits shall have returned to the starting line.

317. **Failure to Record Time.**—In case of failure to record time, the driver shall be allowed to inspect his car and to put it in condition and shall be given one more trial.

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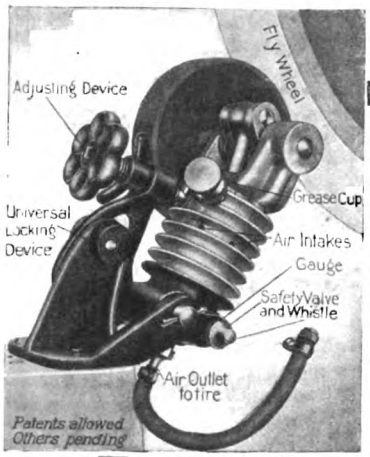

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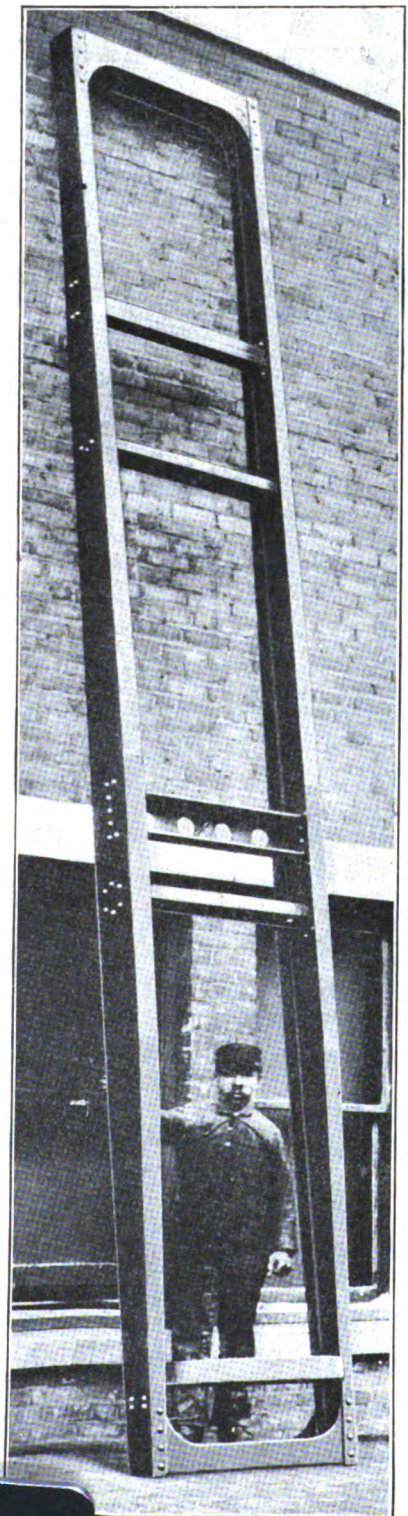

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